Geographic Concentration of Venture Capital Investors, Corporate Monitoring, and Firm Performance

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Abstract

This paper examines how the coordination of venture capital (VC) investors in their syndicate, as measured by their geographic concentration, affects their choice of ex ante contractual terms and firm performance. We find that compared to VC investors that are geographically dispersed, those that are geographically concentrated use less intensive staged financing and fewer convertible securities in their investments, are less likely to have board representation in their portfolio firms, and are more likely to form successive syndicates in follow-up rounds. Moreover, their firms experience a greater likelihood of successful exits, lower IPO underpricing, and higher IPO valuation.

Keywords: Venture capital, Geographic concentration, Coordination, Monitoring, Staged financing, Board, IPO

JEL Classification: G23, G24, G34

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1. Introduction

The role of venture capital (VC) investment in creating value for early-stage entrepreneurial firms has been extensively examined in previous studies. For example, the prior literature shows that venture capitalists, particularly lead VC investors, play a critical role in promoting innovation and growth by actively monitoring their portfolio firms (e.g., Hellmann and Puri (2002), Chemmanur, Krishnan, and Nandy (2011), Puri and Zarutskie (2012), Bernstein, Giroud, and Townsend (2016)). However, despite the prevalence of syndication in the majority of VC investments,[1] the coordination of VC investors in syndicates and their role in monitoring the portfolio firms are less understood. In this study, we extend prior studies on the monitoring role of VC investors by examining how close coordination among VC investors affects their choices of ex ante contractual investment terms and the firm performance.

Specifically, we use the geographic concentration of VC investors as a measure of the incentives and effectiveness of their coordination efforts in syndication,[2] and we investigate how this measure affects their use of intensive staged financing and convertible securities in VC investments and their board representation on the portfolio firms. We also examine whether the geographic concentration of VC investors affects the composition of VC investors in follow-up syndication and the ex post performance of their portfolio firms, including the likelihood of a successful exit and IPO underpricing and valuation. Given that VC investors have highly concentrated ownership in early-stage entrepreneurial firms and are actively involved in corporate monitoring (e.g., Lerner (1995)), we expect the effective coordination among the VC investors in a syndicate, as measured by their geographic concentration, to have a significant impact on their incentives to choose certain ex ante contractual investment terms and to monitor the portfolio firm performance.

[1] According to the VentureXpert database, approximately 79.4% of 22,247 VC-backed entrepreneurial portfolio firms in the U.S. received investments from multiple VC investors during the period of 1995-2015.

[2] Prior studies examine how the physical distance between VC investors and their portfolio firms affects corporate governance and firm performance. For example, Lerner (1995) shows that geographically proximate VC investors are more likely to sit on the boards of their portfolio firms, and Bernstein, Giroud, and Townsend (2016) find that close distances between VC investors and portfolio firms improve corporate innovation and the portfolio firms' exit performance. Unlike these studies, we focus on the geographic concentration among VC investors as a new measure of investor geography and use it to capture their coordination incentives and effectiveness.

Syndications of VC investors are particularly important for financing early-stage firms. Since the value of entrepreneurial firms is closely related to their growth options, which are characterized by high information asymmetry and uncertainty, sharing value-relevant private information about these firms among VC investors and providing value-added service to them become important issues in VC syndication.[3] However, the free-rider problem and divergent incentives within VC syndicates can cause coordination friction and thus prevent VC investors from performing effective monitoring of their portfolio firms (e.g., Casamatta and Haritchabalet (2007), Nanda and Rhodes-Knopf (2019)).[4] We argue that the geographic concentration of VC investors mitigates this coordination friction and reduces the costs of coordinated governance actions, resulting in more effective coordination and monitoring.

We focus on the geographic concentration of VC investors, since the distance between the VC investors can have a significant effect on the time and effort that VC investors need for effective networking, which is essential to the functioning of VC. For example, Hochberg, Ljungqvist, and Lu (2007) show that VC networks enhance fund performance by providing a broad range of inputs for entrepreneurial firms. The recent survey by Gompers et al. (2018) further shows that VC networks play essential roles both in terms of value-added activities and deal sourcing and that geography and social connections are important considerations for VC investors when choosing their syndicate partners, together with the partners' expertise, past shared successes, reputation, track records, and capital. In addition, previous studies show that VC investors rely extensively on networking within their syndicate for sharing information on new and ongoing investments, innovation, and technology (Bygrave (1987)). In particular, Wright and Lockett (2002) show that lead VC firms, which play an instrumental role in syndicate management, tend to communicate with other syndicate members every month and have face-to-face meetings quarterly. Thus, by reducing travel time and cost, the geographic concentration of VC

[3] See, for example, Lerner (1994), Sorensen and Stuart (2001), Cestone, Lerner, and White (2006), Casamatta and Haritchabalet (2007), and Chemmanur and Tian (2011) for a detailed discussion of the importance of VC syndication in the financing of early-stage entrepreneurial firms.

[4] Previous studies show that the differences in fund size, investment horizons, fundraising cycles, contracts with limited partners, market cycles, and the free-rider problem are important drivers of coordination frictions in VC syndicates (e.g., Barott (2016), Chakraborty and Ewens (2016), Nanda and Rhodes-Knopf (2019)).

investors can help them engage in frequent networking, enabling efficient sharing of their firm-specific information and enhancing the effectiveness of corporate monitoring (Pagano and Jappelli (1993), Hong, Kubik, and Stein (2005), Doblas-Madrid and Minetti (2013), Doidge et al. (2015)).

Although the rapid development of telecommunications over the past decade has improved investors' ability to collect and communicate information and, thus, might reduce the importance of geographic proximity in enabling information sharing among VC investors, VC investors rely relatively more on soft information (i.e., qualitative information obtained from direct contacts and private interactions with corporate managers and syndicate partners that is difficult to convert, store and transmit in numbers (Stein (2002), Liberti and Petersen (2018)) in evaluating new and ongoing investments[5] than on the hard information available from the internet and online communication. Thus, irrespective of the development of communication technologies, compared to remote VC investors, VC investors located near other VC investors generally tend to have greater abilities to share private soft information about the firms through informal discussion.[6] Geographically proximate VC investors can also maintain better collaborative relationships than remote VC investors because they can readily visit each other and directly observe the investor-specific characteristics of nearby VC syndicate members, such as their risk attitude, monitoring incentives, and coordination intention.

These arguments suggest that the geographic concentration of VC investors increases their incentives to share value-relevant soft information and their ability to observe other VC investors' behaviors and soft information and, thus, decreases their information asymmetry vis-à-vis other VC

[5] The key characteristics of an entrepreneurial firm that tend to mostly be soft information, such as skilled human capital, organizational endowment and culture, and superior technology (Drucker (2007)), are highly valuable to VC investors. Cornelli, Kominek, and Ljungqvist (2012) highlight the importance of soft information in monitoring the managers of private-equity-backed firms.

[6] The VC investors in a syndicate frequently interact with each other in formal and informal ways, such as attending demo days and social meetings to exchange information about existing investments and new deals. Important soft information, such as fundraising plans and investment horizons, that determines the VC investors' investment priority and strategy can be credibly exchanged when they are located close to each other. Moreover, geographically dispersed VC investors who have disadvantages in terms of travelling may face more differences in culture and institutional environment relative to the geographically proximate VC investors. To the extent that the cultural distance creates friction in corporate decisions (e.g., Ahern, Daminelli and Fracassi (2015)), the geographic distance between VC investors is expected to have a significant adverse effect on their coordination effort.

investors. This lower information asymmetry reduces moral hazard problems among VC investors (Grossman and Hart (1980), Holmstrom (1982), Shleifer and Vishny (1986), Cestone, Lerner, and White (2006)), thereby increasing their monitoring and coordination incentives.[7] Notably, the information asymmetry among VC investors cannot be captured by the distance between VC investors and firms. Although the close distance between VC investors and firms makes it easier for VC investors to obtain firm-specific private information, it does not allow VC investors to directly observe other VC investor-specific characteristics, such as their risk preference and monitoring incentives, which are important to understanding the VC investors' coordination incentives in syndicates. In particular, to the extent that entrepreneurial firms have relatively larger intangible assets than mature firms, monitoring entrepreneurial firms requires large costs. These high costs of monitoring exacerbate free-rider problems (Gompers (1995)); thus, the geographic concentration of VC investors is expected to play an important role in improving the observability of their risk preference and monitoring efforts and mitigating free-rider problems in corporate governance.

These arguments suggest several testable predications. First, the lower coordination costs associated with a close geographic concentration allows geographically proximate VC investors to effectively monitor their portfolio firms, thus reducing their incentives to extensively rely on ex ante costly contractual investment terms designed to help protect their downside risk. The previous literature shows that various contractual arrangements, such as staged financing (the number of financing rounds and the duration between successive financing rounds), convertible securities, and board participation, help VC investors alleviate agency problems in early-stage firms.[8] For example, the staging of capital

[7] Holmstrom (1982) argues that information asymmetries arise because the actions of individuals cannot be observed and these information asymmetries are the main source of free-rider problems.

[8] The previous literature on the principal-agent problem in financial contracting suggests that the free-rider problem within a VC syndicate can have a significant impact on VC contracts with entrepreneurs (Holmstrom (1979), Ross (1977), Diamond (1991), Aghion and Bolton (1992), Dewatripont and Tirole (1994), Kaplan and Strömberg (2003, 2004)). The coordination frictions within VC syndicates that arise due to a free-rider problem among VC investors weaken the VC investors' incentives to monitor entrepreneurs, which increases the entrepreneurs' agency problems, such as effort reductions after receiving the VC investments, since they do not suffer the full consequences of effort reductions (Holmstrom (1979)). This increase in the entrepreneurs' agency problems incentivizes VC investors to

investment can mitigate agency problems in portfolio firms and reduce the risk to VC investors by generating option-like payoffs to entrepreneurs (e.g., Sahlman (1990), Admati and Pfleiderer (1994), Gompers (1995), Tian (2011)). By refusing to provide follow-up funding or abandoning the project if the entrepreneur fails to meet milestones, VC investors can constrain the entrepreneur's behavior, thereby reducing incentive conflict problems. However, VC staging is costly due to lack of economies of scale in the investment, the portfolio firms' myopic incentives, and other general contracting costs (e.g., Wang and Zhou (2004), Tian (2011)). Given that the VC investors' coordination efforts and time to monitor portfolio firms also involve high costs, investors might have strong incentives to minimize the monitoring costs associated with staged financing. Thus, to minimize the total costs associated with corporate monitoring, VC investors could have strong incentives to rely more on intensive staged financing if their coordination costs are higher. Supporting this view, Gompers (1995) finds that firms with severe agency problems, which are characterized by cross-industry, high levels of asset intangibility, high market-to-book ratios, and intensive R&D activities, experience staging more frequently. Tian (2011) also finds that VC financing for portfolio firms located far from VC investors is characterized by a higher intensity of staging, shorter durations between successive rounds, and smaller investing amounts in each round. To the extent that monitoring of remote firms is difficult and costly, the results suggest that VC investors facing difficulties in monitoring portfolio firms are more likely to have ex ante contractual terms that provide greater protections against misappropriation by the portfolio firm managers. Thus, we predict that geographically dispersed VC investors focus more on staged financing because their inferior abilities to monitor the firms incentivize them to use stricter ex ante contractual terms.[9]

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use more of performance-sensitive, contingent contracts (e.g., staging and convertible securities) in the VC contracts.

[9] Alternatively, poorer coordination among geographically dispersed VC investors can reduce their bargaining power with portfolio firms, making it difficult for these VC investors to impose strict contractual terms, such as intensive staged financing and the use of convertible securities that are beneficial to them. However, our results, which show that geographically dispersed VC investors use stricter contractual terms than geographically concentrated VC investors, do not support this alternative view. Instead, the results are consistent with our argument that VC investors with poorer coordination are more likely to use other costly governance mechanisms, such as requiring stricter ex ante contract terms in their investments. The results also suggest that, for VC investors with

Previous studies also highlight the use of convertible securities to protect investors against downside risk and to provide entrepreneurs with strong incentives to exert greater effort (Casamatta (2003), Cornelli and Yosha (2003), Kaplan and Stromberg (2003; 2004), Schmidt (2003), Repullo and Suarez (2004), Dessi (2005), Hellmann (2006)). To the extent that geographically dispersed VC investors face greater information asymmetry and larger free-rider problems in corporate governance than geographically proximate VC investors, the former might have stronger incentives to include downside-protecting contractual cash flow rights, such as convertible securities, in their investments. Therefore, we hypothesize that geographically dispersed VC investors use a larger proportion of convertible securities in their investments than geographically proximate VC investors to constrain the behavior of entrepreneurs.

To address the difficulty with effective monitoring, geographically dispersed VC investors might also have strong incentives to exert their influence on managerial decisions through board participation. As a vigilant protector of shareholders' interests, boards are expected to play an important role in monitoring the performance of managers (Fama (1980), Hermalin and Weisbach (1998)). In particular, since private firms whose stocks are not listed on exchanges face little pressure from external governance forces, such as stock market monitoring and the market for corporate control, internal governance mechanisms, such as boards of directors, are expected to play an instrumental role in disciplining the managers of these firms (Fama (1980), Fama and Jensen (1983)). Because geographically dispersed VC investors face difficulties in information sharing and incur high costs when engaging in coordinated governance actions, they are expected to occupy more seats on the boards of their portfolio firms to overcome these disadvantages in coordination.[10] We examine this prediction using manually collected board information on portfolio firms.

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better coordination, the marginal cost of improving the portfolio firms' internal governance by having a strict contractual term is higher than the benefit arising from having such a contractual term.

[10] There is little evidence of board monitoring by VC investors in VC-backed firms due to a dearth of data. The only exceptions are Lerner (1995), who finds that geographic proximity between VC investors and portfolio firms leads VC investors to occupy more board seats in their portfolio firms, and Bengtsson and Sensoy (2011), who show that highly experienced VC investors are more likely to join the boards of portfolio firms. Baker and Gompers (2003)

Second, we expect that the geographic concentration of VC investors improves the coordination outcomes in follow-up financing rounds and portfolio firm exit performance due to improved coordination among the geographically proximate VC investors. A different composition of VC investors in the follow-up round of syndication could imply a significant free-rider problem in the previous round and additional coordination costs for the newly joined investors (Chemmanur and Tian (2011)). Therefore, the continuous participation of existing geographically proximate VC investors in the follow-up round of syndication can be important evidence of greater coordination among VC investors. Similarly, to the extent that the VC investors' coordination improves the portfolio firm performance through superior monitoring and value-added service, we also predict that the portfolio firms of geographically proximate VC investors are more likely to successfully exit through IPOs or acquisitions than are those of geographically dispersed VC investors.

Finally, we expect the geographic concentration of VC investors to reduce IPO underpricing through effective coordination and a reduced information gap with respect to the true firm value.[11] Effective monitoring by geographically proximate VC investors also suggests that their portfolio firms' valuation around IPOs is higher than those of geographically dispersed VC investors.[12]

Using a large sample of VC-backed U.S. entrepreneurial firms covered by Thomson Reuters' VentureXpert database for the period of 1995-2015 and measuring the geographic concentration of VC

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and Hochberg (2012) further document that VC-backed firms have more independent directors on their boards than non-VC-backed firms at the time of an IPO.

[11] Large IPO initial returns (i.e., underpricing) have been extensively studied in the previous literature (e.g., Rock (1986), Allen and Faulhaber (1989), Welch (1989), Loughran and Ritter (2002)). Studies of VC investors have shed further light on the relation between IPO underpricing and the role of VC investors. For example, Barry et al. (1990) and Megginson and Weiss (1991) show that VC-backed portfolio firms have lower IPO underpricing because VC investors provide better monitoring services and play a more important role in reducing the information asymmetry between portfolio firms and outside investors. Butler and Goktan (2008) further find that VC-backed firms located close to the lead VC experience lower IPO underpricing.

[12] This prediction does not necessarily suggest that VC investors should avoid syndicates with geographically distant VC investors since geographic dispersion incurs significant coordination costs. There are several potential benefits stemming from having syndicates with remote VC investors. For example, in their survey paper, Gompers et al. (2018) show that VC investors form syndicates mainly to obtain complementary expertise, to reduce capital constraints, and for risk sharing, suggesting that the syndicate partners' expertise, past shared successes, reputation, and track records are important factors when forming a syndicate. To the extent that remote VC investors have better expertise and experience than nearby VC investors in venture capital investing, the benefits arising from geographic dispersion may exceed its costs (e.g., an increase in monitoring/coordination cost) for certain VC syndicates.

investors with VC (lead VC) fund-specific locations, we find results that are strongly consistent with the predictions above. Specifically, controlling for the physical distance between lead VC investors and portfolio firms, funding characteristics, and industry, year, first financing year, firm state, and lead VC investor fixed effects, we find that the geographic dispersion of VC investors increases the extent of staged financing (i.e., a greater number of financing rounds and a shorter time interval between successive rounds) and the ratio of the amount of convertible securities used to the total funding amount in each financing round. Thus, distant VC investors, who must incur high costs in monitoring their portfolio firms due to their location disadvantages, have strong incentives to impose ex ante contractual investment terms that help mitigate the agency conflicts of managers in portfolio firms.

Moreover, we find that the proportion of VC directors on the boards of their portfolio firms in an IPO year is negatively associated with the geographic concentration of VC investors, suggesting that VC investors take more active positions on the board when geographic dispersion exacerbates coordination problems and increases the need for oversight. This result is again consistent with our prediction that a lack of effective coordination among VC investors encourages geographically dispersed VC investors to use alternative mechanisms to protect themselves.

Turning to the analysis of the effects of the geographic concentration of VC investors on their continuous participation in follow-up financing rounds and the likelihood of a successful exit, we find that, as the distance between VC investors decreases, both the proportion of existing VC investors who participate in a follow-up syndication round and the likelihood of a successful exit through IPOs or acquisitions increase.

Finally, we find that portfolio firms with geographically concentrated VC investors experience lower IPO underpricing and significantly higher valuation multiples around IPOs, suggesting that the VC investors' better coordination, facilitated by their physical location, reduces information asymmetry with respect to IPO firms and increases the monitoring effectiveness.

Although the inclusion of several fixed effects in the regressions helps alleviate the endogeneity problems associated with time-invariant omitted variable biases, our results are subject to other

endogeneity problems. For example, unobserved time-variant characteristics of entrepreneurial firms and VC investors can simultaneously affect VC investment/syndication decisions and our outcome variables. It is also possible that promising deals attract a group of VC investors geographically close to a lead VC investor through better information sharing. To mitigate these endogeneity problems, we use the introduction of new direct airline routes that reduce the travel times between VC investor locations as an exogenous shock to geographic concentration (Giroud (2013), Bernstein, Giroud, and Townsend (2016)).[13] This identification setting that exploits the exogenous variation in the VC investors' involvement after initial investments allows us to unambiguously examine the VC investors' post-investment monitoring role given their unchanged initial screening abilities.[14]

Using a difference-in-differences estimation, we find that the treatment increases the duration between the two financing rounds by 31.6% and decreases the ratio of the use of convertible securities by 4.4%, suggesting that our previous findings for the effects of the VC investors' geographic concentration on the contractual investment terms are causal and economically large. We also find that the treatment increases the proportion of the number of existing VC investors that participate in the follow-up syndication round and the probability of a successful exit by 1.4% and 5.3%, respectively, suggesting a causal relation between the VC investors' geographic concentration and better coordination outcomes. Moreover, we find that these results are driven primarily by the reductions in travel time between the lead VC investors and other VC investors, indicating that the airline shock helps increase the coordination

[13] Consistent with the prior literature (e.g., Bygrave (1987), Wright and Lockett (2002)), our private interviews with several VC industry professionals, including Sequoia Capital in China, Samsung Ventures in Korea, and CreditEase in Hong Kong, suggest that VC investors in the syndication network indeed visit each other to discuss issues related to their portfolio firms. These professionals further state that their coordination can be improved if a direct flight is introduced since such a flight reduces their travel time. They also report that, given the greater information asymmetry of the early-stage firms they invest in, the communication intensity and demand for active commitment are stronger in VC investments than in buyout investments by private equity funds and other public firm investments by institutional investors. Overall, our interviews with VC investors indicate a consensus among VC fund managers that a change in the coordination cost arising from the reduction in travel time would shift the spatial range of their investments and their coordination intensity. We thank Andrew Wu, Sangchul Bae, and Seungha Ku of Sequoia Capital, Samsung Ventures, and CreditEase, respectively, for their discussions on the issues related to VC investors' networking and coordination.

[14] For example, the geographic proximity between VC investors can improve the screening abilities of VC syndicates and, thus, enable them to choose better start-up firms with few entrepreneur moral hazard problems.

between these VC investors by reducing their travel time. Since the lead VC investors tend to play an instrumental role in the VC investments and networking in the syndicate and, thus, they are very sensitive to coordination costs, this result further suggests that the underlying channel for our results is closely related to the VC investors' monitoring and coordination rather than pre-investment screening. The results using airline shocks also remain significant when we use a propensity score matching approach and control for the local economy conditions in the regressions.

Our study contributes to the literature in at least three important ways. First, by providing evidence for the role of the geographic concentration of VC investors on the corporate governance of portfolio firms, our study extends the literature on VC investments. Previous studies exploring the role of geography in VC investment focus exclusively on the geographic proximity between the VC investors and the portfolio firms and find evidence of local bias in VC investments (e.g., Sorenson and Stuart (2001), Cumming and Dai (2010)), higher representation of board membership in portfolio firms by geographically proximate VC investors (Lerner (1995)), and lower IPO underpricing of portfolio firms with geographically proximate VC investors (Butler and Goktan (2008)). More recently, Bernstein, Giroud, and Townsend (2016) show that the entrepreneurs' innovation and exit performance are related to the geographic proximity of entrepreneurs and VC investors. Our study differs from these studies by focusing on the coordination and monitoring roles of geographically concentrated VC investors and provides new evidence for how their coordination affects corporate governance and firm performance.[15]

Second, our paper contributes to the VC literature by examining how the geographic concentration of VC investors affects their incentives to choose certain ex ante contractual terms in VC

[15] Using all institutional shareholders covered in Thomson Reuters' CDA/Spectrum Institutional (13F) Holdings database, Huang (2015) and Huang and Kang (2017) examine the effects of the geographic concentration of institutional investors on the effectiveness of institutional monitoring and find that geographic proximity among institutional investors increases the firm value and monitoring efficiency. Unlike these studies, we focus on only one type of homogeneous institutional shareholder, namely, VC investors, whose managers are more likely to meet face to face with their peers at other VC funds than those of other types of institutions, such as mutual funds, banks, and insurance companies. Moreover, while these studies use listed mature firms in their analyses, our study focuses on entrepreneurial firms in which coordination among the large shareholders (i.e., VC investors) and their monitoring are particularly important for firm success.

investments. Existing studies show that VC contracts with entrepreneurs are consistent with the theoretical predictions from the principal-agent problem in financial contracting (e.g., Kaplan and Strömberg (2003, 2004), Hsu (2004), Cumming (2008), Bengtsson and Sensoy (2011, 2015), Da Rin, Hellmann, and Puri (2013)). We focus on several aspects of ex ante contractual features in VC investment, such as staging, security choice, and board representation, and we show how the difficulties in coordination and corporate monitoring incentivize VC investors to choose contractual mechanisms designed to protect them from the downside risks of early-stage entrepreneurial firms.

Finally, our paper contributes to the literature that examines competing views on the rationales for VC syndication, i.e., the value-added view versus the selection view.[16] On the one hand, previous studies show that VC syndication adds value to portfolio firms by pooling the VC investors' complementary skills and information and providing intensive monitoring (e.g., Brander, Amit, and Antweiler (2002), Hochberg, Ljungqvist, and Lu (2007), Chemmanur and Tian (2011), Tian (2012), Bernstein, Giroud, and Townsend (2016)). On the other hand, other studies suggest that syndicates improve the VC investors' ability to select better portfolio firms by certifying other VC investors' investments (e.g., Wilson (1968), Sah and Stiglitz (1986), Lerner (1994), Cestone, Lerner, and White (2006), Casamatta and Haritchabalet (2007), Das, Jo, and Kim (2011)) and by allowing VC investors to expand the spatial diversification of their portfolios (Stuart and Sorensen (2001)). By exploiting the exogenous variations in VC investors' coordination costs in the post-investment stage, we distinguish between these two competing views and find evidence supporting the value-added view on the monitoring role of VC syndication in investment contractual terms and exit outcomes.

The remainder of this paper is organized as follows. Section 2 discusses the sample, variable definitions, and summary statistics. Section 3 presents results for the impacts of the geographic concentration of VC investors on the choice of ex ante contractual terms and Section 4 examines the

[16] See, for example, Kaplan and Strömberg (2001) for theoretical and empirical comparisons between pre-investment screening and post-investment monitoring roles of VCs. It is important to note that the evidence regarding the VC investor's screening and monitoring efforts are closely interrelated, and both activities affect the design of the financial contracts between the entrepreneurs and the investors.

effects of the geographic concentration of VC investors on their continuous participation in the follow-up financing round, the likelihood of a successful exit, and IPO underpricing and valuation. Section 5 provides results from identification tests. Finally, we present our concluding remarks in Section 6.

2. Data and Summary Statistics

2.1. Sample

Our sample consists of VC-backed U.S. entrepreneurial firms covered in Thomson Reuters' VentureXpert database during the period of 1995-2015.[17] VentureXpert, which has been used extensively in the prior literature (e.g., Chemmanur, Loutskina, and Tian (2014), Bernstein, Giroud, and Townsend (2016)), provides detailed firm-specific funding information, such as the VC investor name, investment date of venture financing rounds, amount, security type, and the ultimate portfolio company outcome. We obtain VC fund- and portfolio firm-specific location information (nation, state, and city) from this database. We complement the VentureXpert database with the SDC Platinum and Compustat databases to construct firm- and industry-level control variables. We exclude firms with erroneous entries, such as VC investment dates, stages, founding dates, and exit years. Our final sample consists of 10,594 unique VC-backed firms (45,604 VC investment rounds).[18]

For the analyses of the board structure and IPO performance, we manually collect data from the "Management" section of a firm's IPO prospectus, provided by the Securities and Exchange Commission (SEC). When a firm goes public, it is required to file Form 424B with the SEC, which contains a detailed description of its current management and board of directors, including their names, ages, positions, and

[17] Specifically, following previous VC studies (e.g., Tian (2011), Ewens, Rhodes-Kropf, and Strebulaev (2016), Cunninghamy, Ederer, and Ma (2018)), we use all VC-backed U.S. entrepreneurial firms that received their first VC financing between 1995 and 2010 and obtain information about their subsequent outcomes, such as the duration between financing rounds, exit outcomes, and follow-up syndication ratios for at least the next five years following the first financing.

[18] Our sample includes VC-backed portfolio firms that receive investments from a single VC investor. Firms with a single VC investor, which account for 15.7% of our sample, are used as the control group that does not face coordination problems between VC investors. Our main results are robust to excluding these firms from the sample.

brief profiles. We identify each portfolio firm's VC-affiliated directors by reading the profiles included in Form 424B. The sample consists of 1,008 IPO firms from 1995 to 2015.

The data for identifying the introduction of new direct airline routes are collected from the T-100 Domestic Segment database, which contains the monthly domestic nonstop segment information reported by both U.S. and foreign air carriers, including origins, destinations, departures performed, and ramp-to-ramp time when the origin and destination airports are both located within the boundaries of the U.S. and its territories. All airlines with flights in the U.S. are required by law to file Form 41 with the U.S. Department of Transportation. These data are collected by the Office of Airline Information, Bureau of Transportation Statistics, Research and Innovative Technology Administration, and they are widely used by the aviation industry, press and legislators to analyze information, such as traffic patterns.

2.2. Measures of Geographic Proximity among VC Investors

Similar to Huang and Kang (2017), we use the following six measures to calculate the geographic concentration of VC investors.[19] *Ew Distances* is the logarithm of one plus the equally weighted geographic distance between all of a portfolio firm's VC investor pairs,[20] *Vw Distances (Equity)* is the logarithm of one plus the cumulative investment amount-weighted physical distance between all of a portfolio firm's VC investor pairs,[21] and *Vw Distances (Portfolio)* is the logarithm of one plus the

[19] When constructing the geographic concentration of VC investors, we consider only U.S.-located VC funds, because even a small number of foreign VC funds can exaggerate the geographic concentration of VC investors. In our sample, approximately 12% of the portfolio firms receive investments from at least one foreign VC investor in a certain round. As a robustness check, we examine whether our results are robust to controlling for the existence of foreign VC investors, and we find that the results do not change.

[20] We consider the syndicates within a firm rather than within each financing round. Entrepreneurial firms are most likely to issue new shares in each financing round since existing VC investors are rarely allowed to exit separately before IPOs or acquisitions due to tag-along rights in their shareholders agreements. Therefore, the cumulative composition of shareholders and the geographic concentration of all new and existing VC investors can capture their coordination effectiveness in a better way.

[21] The ratio of a VC investor's cumulative investment amount to the firm's total cumulative VC funding by all VC investors is not necessarily the same as the VC investor's equity ownership in the firm since the portfolio firm value varies across financing rounds. We use the cumulative investment amount as the weight because the valuation data in VentureXpert and other databases (e.g., Venture Source) are limited to only a small proportion of our sample firms in each round. It is also possible that some of the valuation information in these databases might be inaccurate and inflated because it is based on self-reporting by firms. See, Kaplan, Sensoy, and Strömberg (2002), Maats et al. (2011), and Kaplan and Lerner (2017) for detailed discussions of valuation data in VC databases.

portfolio share-weighted physical distance between all of a portfolio firm's VC investor pairs. *Lead Vw Distances (Equity)* is the logarithm of one plus the cumulative investment amount-weighted physical distance between a portfolio firm's lead VC investor and its other VC investors, and *Lead Vw Distances (Portfolio)* is the logarithm of one plus the portfolio share-weighted physical distance between a portfolio firm's lead VC investor and its other VC investors. Lead VC investors are identified as VC firms that invest the largest amount of equity in portfolio firms, as in Hochberg, Ljungqvist, and Lu (2007). For VC firms with an equal investment amount, we choose the one that invests in the firm at the earliest time as the lead VC investor. If there are still ties, we choose the lead VC investor based on its total fund size and the total number of firms in which it invests. Finally, *Log (Number of States)* is the logarithm of the number of unique states in which the VC fund is located.[22]

We also compute *Firm-Lead VC Distances* as the logarithm of one plus the physical distance between the portfolio firm and its lead VC investor. All of these physical distance measures are in units of miles and are calculated using the Haversine formula, based on the geographic coordinates of the city locations for VC investors and portfolio firms. We use a VC fund's location rather than the VC firm's headquarters location when the VC firm has multiple fund offices.[23]

2.3. Summary Statistics

Table 1 provides summary statistics for our sample firms at the financing round level. The equally weighted geographic distance between all of a firm's VC investor pairs is, on average, 665 miles,

[22] Hochberg, Ljungqvist, and Lu (2007) show that VC firms with greater network centrality, measured using historical syndication data, and their portfolio firms experience better performance than other VC firms and portfolio firms. As a robustness test, we control for the past co-investment experience of VC investors in the syndicate, measured as the ratio of the number of the pairs of VC investors that have previously syndicated in other deals to the number of all a firm's VC investor pairs in all the regression analyses below. We find that our results do not change.

[23] For example, Accel Partners manages two funds, i.e., Accel Internet Fund II L.P., located in Palo Alto, CA and Accel Internet Fund III L.P., located in Princeton, NJ. When Accel Internet Fund II L.P. serves as a VC investor for the portfolio firm, we use Palo Alto as the VC investor's location, not the location of Accel Partners' headquarters. We obtain the geographic coordinates from the MaxMind GeoIP Database and match the coordinates of each firm city with those of each VC fund city. We compute all of our distance measures using the most recent locations of VC investors and portfolio firms. Since their locations rarely change over time and fewer than 5% of our sample VC investors have fund offices in multiple locations, our approach should not create any systematic bias, as pointed out by Bernstein, Giroud, and Townsend (2016).

and its VC investors are located in 2.24 different states, on average. The mean geographic distance between a firm and its lead VC investor is 756 miles. The shorter average distance for *Ew Distances* than for *Firm-Lead VC Distances* suggests that VC investors tend to choose geographically proximate VC investors when they syndicate.

During our sample period, approximately 10% of our sample firms exit through an IPO (acquisition). On average, our sample portfolio firms receive their first round of VC financing 2.88 years after their foundation and have 3.83 rounds of financing. Our sample IPO firms, on average, have a first-day IPO return of 34%. These firms, on average, have 7.31 board members, of whom 21% are represented by VC investors, and 81% are independent directors. Appendix B provides detailed descriptions of the variables reported in Table 1.

Table 2 presents the distribution of our sample firms and main variables of interest by firm state. Consistent with the distribution reported in Tian (2011), we find that almost 55% of our sample firms are located in California, Massachusetts, and New York. Among all states, VC investors located in California and Massachusetts are more geographically dispersed than those located in the other states, and they use a larger number of financing rounds. Figure 1 illustrates the extent of the geographic distance between the VC investors by firm state. The shade of each state indicates the extent of the average value of equally weighted physical distances between VC investors for VC-backed firms located in that state. A darker color indicates that the firms located in the state have more geographically dispersed VC investors. The figure shows that the geographic dispersion of VC investors is generally common in many states, suggesting that the coordination problems in syndicates are not limited to certain states or regions.

Figure 2 plots the cumulative distribution functions (CDFs) of geographic proximity between VC investors, the investment amount-weighted distances between the portfolio firms' lead VC investors and their other VC investors, and the physical distances between portfolio firms and their lead VC investors. The CDFs of these three geographic distance measures display similar patterns. Consistent with prior studies (e.g., Bernstein, Giroud, and Townsend (2016)), we find that approximately 30% of our sample firms are either financed by only one VC investor or multiple VC investors in the same city. However, the

figure shows that the median equally weighted VC distance (solid line) is 410 miles and the median cumulative investment amount-weighted distance between a portfolio firm's lead VC investor and its other VC investors (dashed line) is 332 miles. It also shows that approximately 35% of our sample firms are financed by VC investors that are located more than 1,000 miles away from each other. This large dispersion in physical distance among VC investors in a syndicate allows us to perform identification tests that will have adequate power.

3. Geographic Concentration of VC Investors and the Choice of Ex Ante Contractual Terms

3.1. Staged Financing

We first examine the extent to which the geographic concentration of VC investors affects their choice of staged financing. Monitoring entrepreneur firms is very costly, and these monitoring costs are expected to be larger for geographically dispersed VC investors due to their coordination disadvantages. Therefore, VC investors that face difficulties in coordination and monitoring due to their geographic dispersion might have strong incentives to overcome such difficulties by relying more on strict ex ante contractual terms, such as using more intensive staged financing. To test this prediction, using a sample of 45,604 firm-financing round observations, we estimate the following regression:

$$Staging_{i,t} = \beta_0 + \beta_1 \cdot VC\ Concentration_{i,t} + \beta_2 \cdot Firm\ Lead\ VC\ Distances_{i,t} + \beta' X_i + \alpha_i + \alpha_t + \gamma_i + \zeta_i + \eta_i + \varepsilon_{i,t} \quad (1)$$

where *i* and *t* index a portfolio firm and year, respectively, and $Staging_{i,t}$ is either the investment interval (*Log (1 + Duration between Two Financing Rounds)*) or the number of financing rounds (*Log (1 + Number of Financing Rounds)*). *Duration between Two Financing Rounds* is the duration in months between the current financing round and the next financing round,[24] and *Number of Financing Rounds*

[24] Tian (2011) notes that duration data are right censored because a subsequent financing round is unobservable if firms exit the venture stage or are in the middle of an ongoing round. Following Tian (2011), we compute *Duration between Two Financing Rounds* as the duration between the last financing round date and an exit event date if the firm exits through either an IPO or acquisition (the end of our sample period if the firm is still in the middle of an

is the total number of financing rounds that the firm has received. *VC Concentration*$_{i,t}$ is a measure of the geographic concentration of VC investors discussed in the previous section, and *Firm-Lead VC Distances*$_{i,t}$ is the logarithm of one plus the physical distance between the portfolio firm and its lead VC investor.[25] We include this variable to control for potential concerns that our results might be driven by a traditional distance measure used in the previous literature (e.g., Lerner (1995), Sorenson and Stuart (2001), Cumming and Dai (2010), Tian (2011)). $X_{i,t}$ is a vector of control variables, including the cumulative number of investors, total funding, funding characteristics (firm age and total funding) in the first round of VC investment (Tian (2011)), an indicator that takes a value of one if the firm is in its seed or early stage when it receives its first VC financing, and zero otherwise (*Early Stage*) (Nahata (2008), Tian (2011)), three measures of industry characteristics (market-to-book ratio, R&D intensity, and asset tangibility), and three measures of VC investor reputation (VC investors' average fund age, average amount of equity invested, and average total number of investment rounds since 1995). The regression also includes several fixed effects as follows: a portfolio firm's industry-fixed effects at the 3-digit SIC level (α_i), year fixed effects for financing rounds (α_t), first (entry) financing year fixed effects (γ_i), firm state fixed effects (ζ_i), and lead VC investor fixed effects (η_i).[26] We cluster the standard errors at the firm's industry level. Our key coefficient of interest is β_1, which measures the effect of the geographic concentration of VC investors on staged financing.

Table 3 presents results from the ordinary least squares (OLS) regressions in which the dependent variable is (*Log (1 + Duration between Two Financing Rounds)*. In column (1), we find that the coefficient on the distance between the firm and the lead VC investor (*Firm-Lead VC Distances)* is not

ongoing round). As a robustness test, we restrict our sample to the firms with an exit event and find that our results remain the same.

[25] Our results are robust to replacing *Firm-Lead VC Distances* with the logarithm of one plus the equally weighted physical distance between the portfolio firm and all of its VC investors.

[26] We include year fixed effects for the financing round to control for any common time trends affecting the entrepreneurial firms' performance. We control for first (entry) financing year fixed effects since Povel et al. (2016) find a significant and persistent entry year effect, especially during industry booms or busts. We include lead VC investor fixed effects to mitigate the concern that unobserved heterogeneity among lead VC investors simultaneously affects both the geographic distribution of the firms' VC investors and their staged investment patterns.

significant. In contrast, the VC investors' geographic dispersion is associated with a significant decrease in time intervals between successive financing rounds in columns (2)-(7). The economic magnitude is also large. For example, in column (2), an increase in *Ew Distances* from the 50th percentile to the 75th percentile decreases the duration between two financing rounds by 2.1%.

In Table 4, we replace (*Log (1 + Duration between Two Financing Rounds)* with *Log (1 + Number of Financing Rounds)* as the dependent variable. Following the previous literature (e.g., Tian (2011)), we limit our attention to only the sample of each firm's final financing round. Specifically, when the firm goes public or is acquired, we use only its last financing round immediately before an IPO or an acquisition. For other firms, we use only the observations in the last available financing round. In column (1), we examine the effect of the distance between the firm and the lead VC investor on the number of staged financing rounds and find that the coefficient on *Firm-Lead VC Distances* is insignificant.[27] In contrast, in columns (2)-(7), we find that the VC investors' geographic dispersion is positively and significantly related to the number of financing rounds at the 1% level, except for column (7), in which the coefficient on *Log (Number of States)* is insignificant. In terms of economic significance, we find that an increase in *Ew Distances* from the 50th percentile to the 75th percentile is associated with an increase in the number of rounds by 1.9% relative to the unconditional sample mean (column (2)).

These results suggest that VC investors that face higher coordination and monitoring costs due to their location disadvantages maintain a tight leash on the entrepreneurs' behavior by shortening the duration between successive financing rounds and increasing the number of financing rounds. These findings support our hypothesis that the superior monitoring ability of geographically concentrated VC investors enables them to focus less on costly staged financing.

3.2. Use of Convertible Securities

[27] While we find that the *Firm-Lead VC Distances* variable does not have a statistically significant effect on the number of staged financing rounds, Tian (2011) shows that its effect is positive and significant. To examine the discrepancy in the results between his and our studies, we restrict our sample period to 2005, as in Tian (2011), and reestimate the regressions. Consistent with Tian (2011), we find that the coefficient on *Firm-Lead VC Distances* is positive and significant.

In this subsection, we examine whether the geographic dispersion of VC investors affects their choice of funding method in VC investment. VC investors that face high information asymmetry and agency problems in early-stage investment might demand downside-protecting contractual cash flow rights, such as the use of convertible securities, especially when they face monitoring disadvantages in constraining the entrepreneurs' behavior. Therefore, we expect the geographic dispersion of VC investors to be positively related to the ratio of the amount of convertible securities used in the investment.[28]

The results using a sample of 45,604 firm-financing round observations are reported in Table 5. The dependent variable, *Ratio of Convertible Securities*, is the ratio of the amount of convertible debt and convertible preferred stock to the total funding amount in each financing round. We use the same control variables as those used in Tables 3 and 4. In particular, we control for firm state fixed effects, since the design of financial contracts can be influenced by the geographic locations of the firms.[29] In column (1), we find that the coefficient on *Firm-Lead VC Distances* is positive and significant, suggesting that lead the VC investors' poor monitoring capability increases their use of risk-hedging securities.

In columns (2)-(7), we add the measures of geographic dispersion of VC investors to column (1). Consistent with our hypothesis, we find that the coefficients on all of the VC investors' geographic concentration measures are positive and highly significant, suggesting that when they face high coordination and monitoring costs due to their geographic dispersion, they use a larger proportion of convertible securities in their investment. Including the VC investors' geographic concentration measures renders the coefficient on *Firm-Lead VC Distances* insignificant. The economic magnitude is also large. For example, in column (2), a one-standard-deviation increase in *Ew Distances* leads to a 3.0% (= 0.009 x

[28] Due to a lack of available data, we are not able to use other covenants or cash flow provisions (e.g., liquidation preference and anti-dilution) in VC investment contracts in our analyses. For studies that investigate the role of these contractual terms using proprietary data on a small number of sample firms, see Kaplan and Strömberg (2003, 2004), Cumming (2008), and Bengtsson and Sensoy (2011, 2015).

[29] In untabulated tests, we also control for a set of stage indicators (i.e., seed, early, expansion, later, mezzanine, and buyout stages) in the regression, because the optimal contracts can differ across a firm's different stages. The results do not change.

3.11) increase in *Ratio of Convertible Securities*, which accounts for more than 6.5% of the unconditional mean *Ratio of Convertible Securities* (43%) used in the VC investments.

3.3. VC Investors' Board Participation

This subsection investigates the relation between the VC investors' geographic concentration and their board participation in entrepreneurial firms using a sample of 796 going-public start-up firms with VC investments for which director information is available on Form 424B. The results are reported in Table 6. The dependent variable is *Percent of VC Directors*, which is the ratio of the number of VC-affiliated directors to the total number of directors on the board of a portfolio firm in an IPO year. In columns (1)-(7), we find negative and insignificant coefficients on *Firm-Lead VC Distances*. These results are different from Lerner (1995), who shows that geographically proximate VC investors are more likely to sit on the boards of their portfolio firms. To determine why the results are different between the two studies, we reestimate the regressions in Table 6 using the same regression specifications as those used in Lerner (1995), which do not include lead VC investor fixed effects. Consistent with Lerner (1995), we find that the coefficients on *Firm-Lead VC Distances* are negative and significant. Importantly, we find that the coefficients on the VC investors' geographic dispersion measures are all positive and significant at the 5% level, except for column (7), in which *Log (Number of State)* is used as the geographic concentration measure. Thus, VC investors play a more active role in their portfolio firms' boards when they have a greater need to oversee the firms due to coordination problems arising from geographic dispersion. In terms of economic significance, the coefficient estimate of 0.016 on *Ew Distances* in column (2) suggests that a one-standard-deviation increase in *Ew Distances* leads to a 4.98-percentage point (= 0.016*3.11) increase in *Percent of VC Directors*. Given that the unconditional mean for the *Percent of VC Directors* for the full sample is 21%, this number accounts for more than 23.7% of the sample mean. In untabulated tests, we reestimate the regressions in Table 6 using a two-limit Tobit model and find that the results do not change.

4. Geographic Concentration of VC Investors and Coordination Outcomes

4.1. Successive Syndications in Follow-up Rounds

Thus far, we have examined how the heterogeneous geographic concentration of VC investors affects their choice of ex ante contractual terms in VC investment and board participation. In this subsection, we investigate whether the VC investors' geographic concentration indeed improves their coordination outcomes. The VC investors within a syndicate face coordination friction due to heterogeneous fund characteristics, such as portfolio composition and investment horizon. Moreover, the divergent incentives within a syndicate, combined with free-rider problems among VC investors, decrease their incentives to pursue active monitoring. By facilitating efficient information-sharing among VC investors and increasing the observability of their coordination efforts, a close geographic concentration helps alleviate coordination friction and drives efficient dynamics within a VC syndicate. Thus, we expect that geographically concentrated VC investors are more likely to syndicate together in the follow-up financing round.

Table 7 reports the results from the OLS regressions in which the dependent variable is the ratio of the number of VC investors that participate in both the current and previous rounds to the total number of VC investors in the previous round. Estimating the regressions using a two-limit Tobit model does not change the results. In column (1), we find that the coefficient on the physical distance between the firm and its lead VC is negative but insignificant. In contrast, we find that the VC investors' geographic dispersion reduces the proportion of VC investors that participate in the follow-up syndication round in columns (2)-(7). In column (2), a one-standard-deviation increase in *Ew Distances* leads to a 3.0% (= 0.009 x 3.11) decrease in the proportion of VC investors that participate in successive syndication in the follow-up round, accounting for more than 13.1% of the unconditional mean value of the successive VC syndication (23%) in the follow-up round.

4.2. Exits through IPOs and Acquisitions

As a further test of whether the VC investors' geographic concentration improves their coordination and monitoring effectiveness, we examine whether it affects the exit outcomes of their portfolio firms. We expect that better coordination of geographically proximate VC investors leads to an increase in the likelihood of a successful exit through IPOs or acquisitions.

The results from the linear probability regressions in which the dependent variable is an indicator that takes a value of one if the firm goes public via an IPO or is acquired during the sample period (*Exit*) are reported in Table 8.[30] In column (1), we find that *Firm-Lead VC Distances* does not have a statistically significant effect on the exit outcomes of portfolio firms. However, consistent with our hypothesis, in columns (2)-(7), we find that the coefficients on all of the geographic concentration measures are negative and significant at the 5-10% level. Thus, the geographic proximity of VC investors increases the likelihood of firms going public or being acquired, suggesting that the VC investors' geographic concentration reduces the coordination friction among them and improves their monitoring effectiveness, in turn increasing the likelihood of a successful exit via going public or being acquired. The effect of the VC investors' geographic concentration on *Exit* is economically large and significant. In column (2), the economic magnitude of a one-standard-deviation decrease in *Ew Distances* translates into a 0.3% (= 0.001 x 3.11) increase in the likelihood of a successful exit for a portfolio firm, which accounts for a 6.2% increase compared to the unconditional mean probability of exit (5%). The economic magnitudes of the effects of the other concentration measures on *Exit* are similar to those of *Ew Distances* on *Exit*.[31]

[30] Following Bernstein, Giroud, and Townsend (2016) and Ewens, Rhodes-Kropf, and Strebulaev (2016), we consider only successful exits of entrepreneurial firms with acquisition deal values greater than $25 million, which helps exclude acquisitions that occur due to poor performance or other negative reasons.

[31] The Pearson correlations between *Firm-Lead VC Distances* and our VC dispersion measures for the full sample range from 0.22 to 0.28, raising the concern of a multicollinearity problem. Although our endogeneity test below, using an airline shock, can address this multicollinearity issue, to further examine whether it affects our results, we perform additional robustness tests using *Ew Distances* as the measure of the VC investors' geographic concentration. First, we divide the sample into two subsamples of firms with high and low distances between the portfolio firm and its lead VC investor and reexamine the regressions in Tables 3, 5, 7, and 8 separately for these two subsamples using *Ew Distances* as the measure of the VC investors' geographic concentration. The results in Panels A and B of Table A.1 in Appendix A show that our main results remain the same for both subsamples. As an additional test, we omit *Firm-Lead VC Distances* from the regressions and reestimate them. The results are reported in Panel C of Table A.1. We find that the results do not change.

4.3. Geographic Concentration of VC Investors and IPO Underpricing and Valuation

In this subsection, we examine the relation between the geographic concentration of VC investors and the portfolio firms' IPO underpricing and valuation, using IPO firms as the sample. Our hypothesis predicts that the geographic concentration of VC investors leads to lower IPO underpricing and higher IPO valuation for their portfolio firms due to better coordination and monitoring, which helps reduce the information asymmetry faced by outside investors.

In Panel A of Table 9, we present results from the OLS regressions in which the dependent variable is the IPO underpricing measured by the first-day IPO return (first-day closing price / IPO offer price). All the control variables are measured immediately prior to the IPO. We find that, although the first-day IPO returns are not significantly related to *Firm-Lead VC Distances* in column (1), they are positively and significantly related to the VC investors' geographic distance measures, except for column (7), in which *Log (Number of States)* is used as the geographic concentration measure. The coefficient estimate of 0.026 on *Ew Distances* in column (2) indicates that a one-standard-deviation reduction in *Ew Distances* decreases the first-day return by 8.1% (= 0.026*3.11), accounting for a nearly 23.8% decrease in the unconditional IPO mean return (34%). Thus, the impact of the VC investors' geographic concentration on IPO underpricing is not only statistically significant but also economically large.

The results reported in Panel B of Table 10 show the effect of the VC investors' geographic concentration on the IPO firm valuation. The dependent variable, *IPO Valuation*, is the ratio of the first-trading-day closing stock price to the book value of equity per share (i.e., book value of common equity divided by shares outstanding after the IPO). We find that the coefficients on the geographic dispersion measures are all negative and significant except for column (6). Thus, entrepreneurial firms with geographically dispersed VC investors tend to have lower valuation on the first trading date than those with geographically concentrated VC investors.

5. Identification Tests

5.1. Introduction of New Direct Airline Routes

The investment decisions of VC investors, specifically their syndication decisions, are not random and may be highly correlated with unobservable VC investor and portfolio firm characteristics that affect the portfolio firm performance. This omitted variable problem can potentially bias the estimation of the effect of the VC investors' geographic concentration on their monitoring activities and, thus, on the portfolio firm performance. It is also possible that the VC investors' ability to identify profitable investments might be correlated with their locations. Alternatively, geographically proximate VC investors may have similar preferences for certain start-up firms or for specialties in investing in firms with certain characteristics, which can be correlated with firm performance and governance. Furthermore, promising deals can attract a group of VC investors that are geographically proximate to initial VC investors through better information sharing (i.e., reverse causality).

To address these endogeneity concerns, we use the reduction of travel time due to the introduction of new direct airline routes as a quasi-natural experiment for the VC investors' geographic concentration (Giroud (2013), Bernstein, Giroud, and Townsend (2016)). Giroud (2013) argues that the reduction in travel time due to the introduction of new direct airline routes is exogenous to both the firms' and the institutional investors' characteristics and, thus, can serve as a valid quasi-natural experiment for mitigating the endogeneity problem associated with their geographic locations. Since the introduction of new direct airline routes unexpectedly reduces the travel time between VC investors, it should provide exogenous variation in their coordination costs and, thus, could be a valid instrument for their geographic concentration.

To measure the treatment effect, we first estimate the optimal travel time between the VC investor city pair by considering the driving time from a VC investor city to an airport city and the duration of the flight, including the average time spent at airports. The driving time between the VC investor city pair and between the VC investor city and the airport is calculated using Google Maps API. A portfolio firm in a particular investment round is treated if, compared to the driving time between the VC investor city pair, the flight time between any of its existing VC investors is reduced by more than a half hour in a round trip between the current and next investment rounds. The detailed algorithms used to compute the optimal itineraries and travel times and the assumptions in the definition of treatment are the

same as those used by Giroud (2013) and Bernstein, Giroud, and Townsend (2016). We consider only direct flights because of the compounding probability of delays and cancellations and other types of disutility, such as anxiety about missing a connection or fatigue due to longer transit times when taking indirect flights (e.g., Boeh and Beamish (2012)).[32]

A potential concern with using the introduction of new direct airline routes (*airline shock*) as an exogenous shock to geographic concentration is that airline routes are not randomly introduced. Local shocks in the region of either the VC investor or the portfolio firm could affect both the introduction of new direct airline routes and firm performance. For example, if the firm and its VC investor are located in the same city, a booming economy in this city will lead to improved firm performance and a greater likelihood of new airline routes being introduced due to an increased number of passengers or lobbying by the VC investors. Thus, following Huang and Kang (2017), we address this problem by restricting the shock to new routes that do not involve the city in which a portfolio firm is headquartered.

Table 10 presents the results for the difference-in-differences estimation using two measures of intensity of ex ante contractual terms, the proportion of existing VC investors that participate in a follow-up syndication round, and an exit indicator as the dependent variables. Our key independent variable of interest is *Reduction in Travel Time*, which is an indicator that equals one if the travel time between a VC city and other VC cities is reduced by more than a half hour in a round trip due to the introduction of new direct airline routes in the period between the current and next investment rounds, and zero otherwise.[33] We find that the effects of the VC investors' geographic dispersion on the use of staged financing and convertible securities, syndication dynamics, and exit outcomes are consistent with those in Tables 3, 5, 7,

[32] The termination of existing direct airline routes between VC investors' locations can lead to an exogenous increase in the travel time between them. As pointed out by Giroud (2013), however, the termination events are less frequent and tend to occur in regional routes, resulting in minor effects on travel time and shareholder coordination. Our results remain unchanged if we include the additional treatment dummy for the termination of existing direct airline routes.

[33] *Ratio of Convertible Securities* and the proportion of existing VC investors that participate in a follow-up syndication round are measured at the beginning of each financing round date, while *Reduction in Travel Time* is measured between the current and next financing round dates. Therefore, we use the lagged *Reduction in Travel Time* when estimating the regressions that use these two variables as the dependent variables. We consider the first financing rounds as untreated when we use the lagged *Reduction in Travel Time*.

and 8, suggesting that our previous results are robust to controlling for potential endogeneity problems. The magnitudes of the coefficients on *Reduction in Travel Time* reported in Table 11 are relatively larger than those of the coefficients on the distance between VC investors in Tables 3, 5, 7, and 8. This is possibly due to the fact that while the latter coefficients capture the local average treatment effect in the population, the former coefficients capture the effect only for the observations influenced by the instruments, not necessarily the average treatment effect (Imbens and Angrist (1994)). Thus, the IV estimation may pick up the effects on VC syndicates that have greater exposure to airline transportation, for which geographic dispersion can have a large influence. [34] In economic terms, the treatment increases the duration between the two investment rounds by 31.6% and decreases *Ratio of Convertible Securities* by 4.4%. The treatment also increases the proportion of existing VC investors who participate in a follow-up syndication round and the probability of having a successful exit by 1.4% and 5.3%, respectively.[35] Thus, the effects of the VC investors' geographic dispersion on the choice of contractual features in VC investments and coordination outcomes are relatively large.[36]

5.2. Robustness Tests

5.2.1. Propensity Score Matching

[34] Using airline shocks as an exogenous shock to geographic concentration may be subject to a potential selection bias problem if the treated firms are more likely to receive financing from VC investors, because the dependent variables in columns (1), (2) and (3) can be measured only when the next round is realized, However, this measurement issue makes the duration between two investment rounds become shorter and, thus, would bias the results against our hypothesis.

[35] The exit probability of 5.3% is larger than that documented in Bernstein, Giroud, and Townsend (2016), who show that the probability of a successful exit increases by approximately 1% after the introduction of new airline routes that reduce the travel time between a VC investor and its portfolio firm. However, it should be noted that unlike Bernstein, Giroud, and Townsend (2016), who use firm-VC investor-year-level observations from 1977-2006 as their sample, our sample consists of firm-financing round-level observations from 1996 to 2015. Our sample firms have a mean (median) of 5.0 (6.1) investors in their cumulative syndication and a mean (median) of 2.2 (1.0) years of duration between two consecutive financing rounds. Therefore, the economic magnitude of the treatment effects among VC investors (0.5%=5.3% / (5.0*2.2)) is approximately one-half of the treatment effects between the firms and VC investors shown in Bernstein, Giroud, and Townsend (2016).

[36] Firms with geographically dispersed VC investors are more likely to experience the airline shock because air travel tends to be optimal only for VC investors located sufficiently apart. However, this endogenous treatment selection would likely bias our results toward finding no effect of the treatment; thus, it is unlikely to drive our results reported in Table 10.

While *airline shock* is arguably exogenous, several observable VC investor-, firm-, and location-specific characteristics may still affect the probability of firms being treated. To further address this concern, we use a propensity score-matching approach. Specifically, we estimate the propensity scores using a probit regression in which the dependent variable is an indicator that takes a value of one if a firm experiences a reduction in travel time between the current and next investment rounds due to the introduction of a new direct airline route, and zero otherwise. To calculate the propensity score, we use the following variables: *Ew Distances*, *Firm-Lead VC Distances*, the same set of control variables used in Table 10, and industry, year, first financing year, firm state, and lead VC investor fixed effects. We then match the control firm that does not experience the introduction of a new direct airline route based on the predicted probability of being treated. Table A.2 compares the mean difference in characteristics between the treated and control financing rounds. We find that no characteristics are significantly different between the two groups, indicating that propensity score matching effectively identifies the matching financing rounds. The results using a propensity score matching sample are reported in Panel A of Table 11. We find that our treatment effects remain unchanged.

5.2.2. Treatment Effects for Lead and Non-Lead VC Investors

Since the lead VC investors are more active than other VC investors in post-investment monitoring, their coordination and monitoring incentives are more likely to be sensitive to a reduction in their travel time (Bernstein, Giroud, and Townsend (2016)). Thus, although the VC investors' coordination effort and involvement are not directly observable following the treatment, we can indirectly infer such effort and involvement by examining whether the results are more pronounced for the treated VC investor pairs involving a lead VC investor than for those not involving the lead VC investor.

To examine whether our results differ for lead and non-lead VC investors, we define two treatment indicators as follows: *Lead VC Reduction in Travel Time*, which takes the value of one if any VC investor in the treated VC investor pair is a lead VC investor, and zero otherwise; and *Non-Lead VC Reduction in Travel Time*, which takes the value of one if all of the VC investors in the treated VC

investor pair are non-lead VC investors, and zero otherwise. The results are reported in Panel B of Table 11. We find that the treatments for both the lead and non-lead VC investors have significant effects on the outcome variables. However, the coefficients on *Lead VC Reduction in Travel Time* are significantly larger than those on *Non-Lead VC Reduction in Travel Time*, except for column (3), suggesting that the underlying channel of our treatment effects is derived mainly from the VC investors' enhanced monitoring and coordination.

5.2.3. Excluding Treatment with Short Distances

If VC investors are closely located to each other, airline shocks are less likely to have a significant effect on their coordination efforts and monitoring incentives. Therefore, as a further robustness test, we exclude the airline shocks with a short distance from the analysis and use only a shock in which the average distance between the VC investor pairs is greater than 200 km in estimating the regressions. The results are reported in Panel C of Table 11. We find that our treatment effects are robust to the exclusion of the airline shocks with a short distance. The results are robust to using different thresholds (60 miles and 150 miles) for the average distance between investors.

5.2.4. Excluding Portfolio Firms in California

Almost 39% of our sample firms and 36% of their lead VC investors are located in California. To alleviate the concern that our main results are driven by firms that are located in California, we exclude firms headquartered in California from the analysis and reestimate the regressions in Table 10. After excluding firms in California, we find that the proportion of firms that experience an *airline shock* is approximately 11.1%, which is almost identical to the proportion for the full sample that includes firms in California, suggesting that our treatment is reasonably random across states. The results are reported in Panel D of Table 11. We find that our treatment effects remain unchanged. In untabulated results, we also reestimate all the regressions in Tables 3-9 after excluding firms located in California and find that the results do not change.

5.2.5. Time-varying State Fixed Effects and Heterogeneity in Financing Rounds

Unobservable firm state- and year-specific heterogeneity, such as state-specific business cycles and regulatory changes, could affect the results in Table 10. To control for this concern, we reestimate the regressions in Table 10 after including portfolio firm state-year fixed effects. The results reported in Panel E of Table 11 show that including these fixed effects does not change our results. Additionally, the contractual terms in the VC investment and the motivation for syndication may differ across financing rounds. Thus, to control for the differences in the VC investment dynamics across financing rounds, we reestimate the regressions in Table 10 by including financing round fixed effects. The results reported in Panel F of Table 11 show that our inferences remain the same, mitigating a potential concern that our results are driven by a mechanical effect of the increased number of investors over time. Another concern is that portfolio firms' first VC financing characteristics in different years could have persistent heterogeneous effects on the contractual investment terms and exit performance (Bernstein, Giroud, and Townsend (2016)). To address this concern, in addition to including first financing year fixed effects, we also add interaction terms between the firm- and VC-first round characteristics (*Ew Distances*, *Firm VC Distances*, firm age, VC investment amount, the number of VC investors in the syndication, average VC investor age, and the average number of portfolio firms held by VC investors) with year fixed effects to the regressions in Table 10 and reestimate them. The results reported in Panel A of Table A.3 in Appendix A show that our main findings do not change. As a further robustness test, we reestimate the regressions in Table 10 by replacing firm state fixed effects with lead VC investor-MSA-year fixed effects to control for omitted local- and lead VC investor-level characteristics. We find that the results remain the same (Panel B of Table A.3 in Appendix A). Finally, in untabulated tests, we exclude the top 10% of the observations where the states in which the lead VC investors are located experience greater economic booms based on the state-level annual GDP growth rate when estimating the regressions and find that the results do not change. Overall, these results suggest that the addition of new airline routes is plausibly exogenous to the characteristics of startup firms and VC investors.

5.2.6. Using Reduced Travel Time as a Shock to the VC Investors' Geographic Concentration

Thus far, we follow Giroud (2013) and Bernstein, Giroud, and Townsend (2016) when defining the treatment (i.e., half an hour time-saving). However, we acknowledge that the choice of a half hour is not based on the evidence that such a reduction in travel time significantly increases the frequency of the interactions among VC investors. To address this concern, we replace the *Reduction in Travel Time* indicator with a reduced travel time due to an *airline shock* between VC investors. Specifically, we measure the travel time reduction as the natural logarithm of one plus the average reduction in travel time between treated VC investor pairs for each firm-round observation (*Log (1 + Reduced Travel Time)*). The results are presented in Panel C of Table A.3 in Appendix A. We find that a larger reduction in travel time has a stronger treatment effect than does a shorter reduction in travel time, except for column (3). These results further support our hypothesis that the reduction in the travel time between VC investors improves their coordination and monitoring effectiveness.

5.2.7. Eventually Treated Sample

In unreported tests, we find that eventually treated firms (i.e., firms that are treated at least once during our sample period) and never-treated firms are different in several observable characteristics.[37] In our analysis, the staggering introduction of new airline routes mitigates the selection bias of being treated since eventually treated firms are included in both the control and treatment groups in different financing rounds. To further examine this issue, we restrict both the treatment and control samples used in the regressions to eventually treated firms and reestimate the regression in Table 10.[38] The results reported in Panel D of Table A.3 in Appendix A show that our main results in Table 10 remain the same.

5.2.8. Technological Innovation and Time-varying Importance of Geography

[37] For example, the average equally weighted geographic distance between all VC investor pairs for eventually treated firms is 1,001 miles, while the corresponding distance is only 511 miles for never-treated firms.

[38] See Bertrand and Mullainathan (2003), Giroud (2013), and Bernstein, Giroud, and Townsend (2016) for a discussion of the use of the ever-treated sample in their analyses.

There have been groundbreaking developments in information technologies regarding communication and transportation during our sample period, which could enable investors to coordinate more efficiently. Thus, this technological innovation may reduce the effects of the introduction of direct airline routes on the VC investors' coordination. To address this issue, we define two treatment indicators: *Pre-2005 Reduction in Travel Time*, which takes the value of one if any VC investor pair is treated before 2005, and zero otherwise; and *Post-2005 Reduction in Travel Time*, which takes the value of one if any VC investor is treated in 2005 or after 2005, and zero otherwise. The results are reported in Panel E of Table A.3. We find that the coefficients on both *Pre-2005 Reduction in Travel Time* and *Post-2005 Reduction in Travel Time* are significant, but the absolute values of the coefficients on *Pre-2005 Reduction in Travel Time* are significantly larger than those on *Post-2005 Reduction in Travel Time*. Thus, although the development of information technologies during our sample period appears to reduce the importance of geography in the VC investors' coordination, the role of soft information and, thus, our treatment effects remain significant in the recent period.

5.2.9. Clustering of VC Investors and Entrepreneurial Firms in a Few Cities

Another concern is that VC investors and entrepreneurial firms are highly clustered in a few cities (i.e., San Francisco, New York, San Jose, and Boston), and thus, the treatment events rarely occur in these major venture hubs. In this case, it is possible that our concentration measures simply capture the distance between the firm and its VC investors, not necessarily the distance between the VC investors. Although we exclude VC investors with the same location as the firm city when constructing the treatment variable, to further mitigate this concern, in Panel F of Table A.II, we omit all firms located in the same city as any of their VC investors and reestimate the regressions in Table 10. We find that 19.45% of our sample firms are located in the same city as their VC investors. The results do not change. Moreover, it should be noted that, as shown in Figure 1 and discussed in Section 5.2.4 (i.e., analyses excluding portfolio firms headquartered in California), the VC investors' geographic dispersion and treatment events tend to be

prevalent across many states, which further mitigates the concern that our results are driven by a small number of treatment firms that are located in major venture cities.

5.2.10. Other Robustness Tests

In untabulated tests, we examine the treatment effects for the likelihood of the portfolio firms' exit separately for the subsample of firms that exit through IPOs and the subsample of firms that exit through acquisitions. We find that the results for these two subsamples are qualitatively similar to those reported in Table 10. Next, we include industry-financing year fixed effects to alleviate the concern that any unobservable time-varying industry-level characteristics drive our results. We find that our treatment effects in Table 10 are robust to controlling for industry-financing year fixed effects.

Finally, to address endogeneity concerns in our cross-sectional analyses (i.e., staging, board participation, and IPO valuation analyses), we use a new treatment variable for the introduction of new direct airline routes. Specifically, we use *Reduction in Travel Time_Firm* as the new treatment variable, defined as an indicator for the introduction of new direct airline routes between the starting year of the first financing round and the last year of the final financing round (or exit year when an exit event takes place). We then reestimate the regressions in Tables 4, 6, and 9 by replacing the VC dispersion measures with *Reduction in Travel Time_Firm*. The results are presented in Table A.4. We find that the reduction in travel time leads to less-intensive staged financing (column (1)) and to an increase in IPO valuation (column (4)). However, the coefficient on *Reduction in Travel Time_Firm* is not significant in the regressions that use *Percent of VC Directors* and *IPO Underpricing* as the dependent variables (columns (2) and (3)). One important caveat to these cross-sectional analyses is that firms with longer financing histories are likely to experience more treatment effects. The sample size is also very small, compared to the panel regressions. Thus, the results in Table A.3 should be interpreted with caution.

6. Summary and Conclusion

This paper examines the impact of the VC investors' geographic concentration on ex ante contractual features (i.e., investment terms and board participation) used in VC investment and firm performance. We hypothesize that the geographic proximity of VC investors improves their coordination and monitoring effectiveness through better information sharing and reduced free-rider problems. This improved coordination and better monitoring incentivize geographically concentrated VC investors to rely less on costly ex ante contractual features than geographically dispersed VC investors and enhance the portfolio firms' exit and IPO performance.

Consistent with our hypotheses, we find that compared to geographically concentrated VC investors, geographically dispersed VC investors use more intense staged financing and a larger proportion of convertible securities in their investments in entrepreneurial firms and are more likely to send their representatives to the boards of portfolio firms to overcome their weaknesses in coordination and monitoring. In addition, we find that portfolio firms with geographically concentrated VC investors enjoy better coordination outcomes, as evidenced by a higher proportion of the number of existing VC investors participating in the follow-up round of syndication and a greater likelihood of a successful exit through IPOs or acquisitions. Using a sample of VC-backed IPO firms, we also find that portfolio firms with close geographic concentrations of VC investors experience lower IPO underpricing and higher valuation around IPOs.

Overall, the results documented in this study provide new evidence on the role of geography in VC investors' choice of ex ante contractual features in their investments and how the geographic concentration among VC investors helps add value to portfolio firms by improving their monitoring abilities and incentives.

References

Admati, A., and P. Pfleiderer (1994) Robust financial contracting and the role of venture capitalists. *Journal of Finance* 49:371-402.

Aghion, P. and Bolton, P. (1992) An incomplete contracts approach to financial contracting. *Review of Economic Studies* 59:473-494.

Ahern, K. R., Daminelli, D. and Fracassi, C. "Lost in translation? The effect of cultural values on mergers around the world." *Journal of Financial Economics*, 117 (2015), 165-189.

Allen, F., and G. Faulhaber (1989) Signalling by underpricing in the IPO market. *Journal of Financial Economics* 23:303-323.

Baker, M., and P. Gompers (2003) The determinants of board structure at the initial public offering. *Journal of Law and Economics* 46:569-598.

Barrot, J. N. (2016) Investor horizon and the life cycle of innovative firms: Evidence from venture capital. *Management Science* 63:3021-3043.

Barry, C., Muscarella, C., Peavy III, J., and M. Vetsuypens (1990) The role of venture capital in the creation of public companies: Evidence from the going-public process. *Journal of Financial Economics* 27:447-471.

Bengtsson, O., and B. Sensoy (2011) Investor abilities and financial contracting: Evidence from venture capital. *Journal of Financial Intermediation* 20:477-502.

Bengtsson, O., and B. Sensoy (2015) Changing the nexus: The evolution and renegotiation of venture capital contracts. *Journal of Financial and Quantitative Analysis* 50:349-375.

Bernstein, S., Giroud, X., and R. Townsend (2016) The impact of venture capital monitoring. *Journal of Finance* 71:1591–1622.

Bertrand, M., and S. Mullainathan (2003) Enjoying the quiet life? Corporate governance and managerial preferences. *Journal of Political Economy* 111:1043-1075.

Boeh, K., and P. Beamish (2012) Travel time and the liability of distance in foreign direct investment: Location choice and entry mode. *Journal of International Business Studies* 43:525-535.

Brander, J., Amit, R., and W. Antweiler (2002) Venture capital syndication: Improved venture selection vs. the value-added hypothesis. *Journal of Economics and Management Strategy* 11:423-452.

Butler, A., and M. Goktan (2008) On the role of inexperienced venture capitalists in taking companies public. *Journal of Corporate Finance* 22:299-319.

Bygrave, W. (1987) Syndicated investments by venture capital firms: A networking perspective. *Journal of Business Venturing* 2:139-154.

Casamatta, C. (2003) Financing and advising: optimal financial contracts with venture capitalists. *Journal of Finance* 58:2059-2085.

Casamatta, C., and C. Haritchabalet (2007) Experience, screening and syndication in venture capital investments. *Journal of Financial Intermediation* 16:368-398.

Cestone, G., Lerner, J., and L. White (2006) The design of syndicates in venture capital. Working paper, Harvard University.

Chakraborty, I. and Ewens, M. (2017) Managing performance signals through delay: Evidence from venture capital. *Management Science* 64:2875-2900.

Chemmanur, T., Krishnan, K., and D. Nandy (2011) How does venture capital financing improve efficiency in private firms? A look beneath the surface. *Review of Financial Studies* 24:4037-4090.

Chemmanur, T., Loutskina, E., and X. Tian (2014) Corporate venture capital, value creation, and innovation. *Review of Financial Studies* 27:2434-2473.

Chemmanur, T., and X. Tian (2011) Peer monitoring, syndication, and the dynamics of venture capitalist interactions. Working paper, Boston College.

Cornelli, F., Kominek, Z. and Ljungqvist, A. (2013) Monitoring managers: Does it matter? *Journal of Finance* 68:431-481.

Cornelli, F., and Y. Ove (2003) Stage financing and the role of convertible securities. *Review of Economic Studies* 70:1-32.

Cumming, D. (2008) Contracts and exits in venture capital finance. *Review of Financial Studies* 21:1947-1982.

Cumming, D., and N. Dai (2010) Local bias in venture capital investments. *Journal of Empirical Finance* 17:362-380.

Cunningham, C., Ederer, F., and S. Ma (2018) Killer acquisitions. Working paper, Yale School of Management.

Das, S., Jo, H., and Y. Kim (2011) Polishing diamonds in the rough: The sources of syndicated venture performance. *Journal of Financial Intermediation* 20:199-230.

Dessi, R. (2005) Start-up finance, monitoring, and collusion. *Rand Journal of Economics* 36:255-274.

Dewatripont, M. and Tirole, J. (1994) A theory of debt and equity: Diversity of securities and manager-shareholder congruence. *Quarterly Journal of Economics* 109:1027-1054.

Diamond, D.W. (1991) Debt maturity structure and liquidity risk. *Quarterly Journal of Economics* 106:709-737.

Doblas-Madrid, A., and R. Minetti (2013) Sharing information in the credit market: Contract-level evidence from us firms. *Journal of Financial Economics* 109:198-223.

Doidge, C., Dyck, I., Mahmudi, H., and A. Virani (2015) Can institutional investors improve corporate governance through collective action? Working paper, University of Toronto.

Drucker, P. (2012) Management challenges for the 21st century. Routledge.

Ewens, M., Rhodes-Kropf, M., and I. Strebulaev (2016) Insider Financing and Venture Capital Returns. Working paper, California Institute of Technology.

Fama, E. (1980) Agency problems and the theory of the firm. *Journal of Political Economy* 88:288-307.

Fama, E., and M. Jensen (1983) Separation of ownership and control. *Journal of Law and Economics* 26:301-325.

Giroud, X. (2013) Proximity and investment: Evidence from plant-level data. *Quarterly Journal of Economics* 128:861–915.

Gompers, P. (1995) Optimal investment, monitoring, and the staging of venture capital. *Journal of Finance* 50:1461-1489.

Gompers, P., Gornall, W., Kaplan, S.N. and Strebulaev, I.A. (2016) How do venture capitalists make decisions? Working paper, National Bureau of Economic Research.

Grossman, S., and O. Hart (1980) Takeover bids, the free-rider problem, and the theory of the corporation. *Bell Journal of Economics* 11:42-64.

Hellmann, T., and M. Puri (2002) Venture capital and the professionalization of start-up firms: Empirical evidence. *Journal of Finance* 57:169-197.

Hellmann, T. (2006) IPOs, acquisitions, and the use of convertible securities in venture capital. *Journal of Financial Economics* 81:649-679.

Hermalin, B., and M. Weisbach (1998) Endogenously chosen boards of directors and their monitoring of the CEO. *American Economic Review* 88:96-118.

Hochberg, Y., Ljungqvist, A., and Y. Lu (2007) Whom you know matters: Venture capital networks and investment performance. *Journal of Finance* 62:251-301.

Hochberg, Y. (2012) Venture capital and corporate governance in the newly public firm. *Review of Finance* 16:429-480.

Holmstrom, B. (1979) Moral hazard and observability. *Bell journal of Economics* 10:74-91.

Holmstrom, B. (1982) Moral hazard in teams. *Bell Journal of Economics* 13:324-340.

Hong, H., Kubik, J., and J. Stein (2005) Thy neighbor's portfolio: Word-of-mouth effects in the holdings and trades of money managers. *Journal of Finance* 60:2801-2824.

Hsu, D.H. (2004) What do entrepreneurs pay for venture capital affiliation?. *Journal of Finance* 59:1805-1844.

Huang, J. (2015) Shareholder coordination, corporate governance, and firm value. Working paper, University of Illinois at Urbana-Champaign.

Huang, X., and J. Kang (2017) Geographic concentration of institutions, corporate governance, and firm value. *Journal of Corporate Finance* 47:191-218.

Imbens, G., and J. Angrist (1994) Identification and estimation of local average treatment effects. *Econometrica*, 62:467-475.

Kaplan, S.N. and Strömberg, P. (2001) Venture capitals as principals: contracting, screening, and monitoring. *American Economic Review* 91:426-430.

Kaplan, S., Sensoy, B., and P. Strömberg (2002) How well do venture capital databases reflect actual investments? Working paper, University of Chicago.

Kaplan, S., and P. Strömberg (2003) Financial contracting theory meets the real world: An empirical analysis of venture capital contracts. *Review of Economic Studies* 70:281-315.

Kaplan, S., and P. Strömberg (2004) Characteristics, contracts, and actions: Evidence from venture capitalist analyses. *Journal of Finance* 59:2177-2210.

Kaplan, S., and J. Lerner (2017) Venture capital data: Opportunities and challenges. *NBER book Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*. pp. 413-431.

Lerner, J. (1994) The syndication of venture capital investments. *Financial Management* 23:16-27.

Lerner, J. (1995) Venture capitalists and the oversight of private firms. *Journal of Finance* 50:301-318.

Liberti, J. M. and Petersen, M. A. (2018). Information: Hard and soft. *Review of Corporate Finance Studies* 8:1-41.

Loughran, T., and J. Ritter (2002) Why don't issuers get upset about leaving money on the table in IPOs? *Review of Financial Studies* 15:413-444.

Maats, F., Metrick, A., Yasuda, A., Hinkes, B., and S. Vershovski (2011) On the consistency and reliability of venture capital databases. Working paper, University of California at Davis.

Megginson, W., and K. Weiss (1991) Venture capitalist certification in initial public offerings. *Journal of Finance* 46:879-903.

Nahata, R. (2008) Venture capital reputation and investment performance. *Journal of Financial Economics* 90:127-151.

Nanda, R., and M. Rhodes-Kropf (2018) Coordination Frictions in Venture Capital Syndicates. Working paper, National Bureau of Economic Research.

Pagano, M., and T. Jappelli (1993) Information sharing in credit markets. *Journal of Finance* 48:1693-1718.

Povel, P., Sertsios, G., Kosová, R., and P. Kumar (2016) Boom and gloom. *Journal of Finance* 71:2287–2332.

Puri, M., and R. Zarutskie (2012) On the life cycle dynamics of venture capital and non-venture capital financed firms. *Journal of Finance* 67:2247-2293.

Rock, K. (1986) Why new issues are underpriced? *Journal of Financial Economics* 15:187-212.

Ross, S. A. (1977) The determination of financial structure: the incentive-signaling approach. *Bell Journal of Economics* 8:23-40.

Repullo, R., and J. Suarez (2004) Venture capital finance: A security design approach. *Review of finance* 8:75-108.

Sah, R., and J. Stiglitz (1986) The architecture of economic systems: Hierarchies and poliarchies, *American Economic Review* 76:716–727.

Sahlman, W. (1990) The structure and governance of venture-capital organizations. *Journal of Financial Economics* 27:473-521.

Schmidt, K. (2003) Convertible securities and venture capital finance. *Journal of Finance* 58:1139-1166.

Shleifer, A., and R. Vishny (1986) Large shareholders and corporate control. *Journal of Political Economy* 94:461-488.

Sorenson, O., and T. Stuart (2001) Syndication networks and the spatial distribution of venture capital investments. *American Journal of Sociology* 106:1546-1588.

Stein, J. C. (2002) Information production and capital allocation: Decentralized versus hierarchical firms. *Journal of Finance* 57:1891-1921.

Tian, X. (2011) The causes and consequences of venture capital stage financing. *Journal of Financial Economics* 101:132-159.

Tian, X. (2012) The role of venture capital syndication in value creation for entrepreneurial firms. *Review of Finance* 16:245-283.

Wang, S., and H. Zhou (2004) Staged financing in venture capital: moral hazard and risks. *Journal of Corporate Finance* 10:131-155.

Welch, I. (1989) Seasoned offerings, imitation costs, and the underpricing of initial public offerings. *Journal of Finance* 44:421-449.

Wilson, R. (1968) The theory of syndicates. *Econometrica* 36:119-132.

Wright, M., and A. Lockett (2002) Structure and management of syndicated venture capital investments. *Journal of Private Equity* 5:72-83.

Figure 1
Geographic Distance of Venture Capital (VC) Investors across States

This figure shows the geographic distance between venture capital (VC) investors across states. The shade of each state indicates the extent of the average values of equally weighted physical distances between VC investors for VC-backed firms located in that state. A darker color indicates that the firms located in the state have more geographically dispersed VC investors.

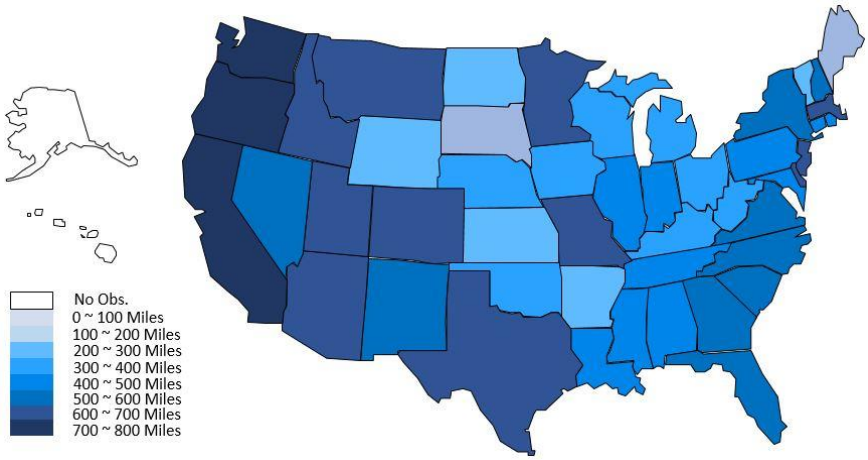

Figure 2
Cumulative Distribution Functions of VC Investor Distance and Firm-VC Investor Distance

This figure plots the cumulative distribution functions of the geographic proximity of VC investors and the physical distances between the portfolio firm and its lead VC investor. *Equally weighted VC Distance* (solid line) is the equally weighted physical distance in miles between all of a firm's VC investor pairs. *Equity-weighted Lead VC Distance* (dashed line) is the investment amount-weighted distance in miles between a firm's lead VC investor and its other VC investors. Only VC investor pairs with a lead VC investor are included in computing the distance. *Firm-Lead VC Distance* (dash-dotted line) is the physical distance in miles between the portfolio firm and its lead VC investor.

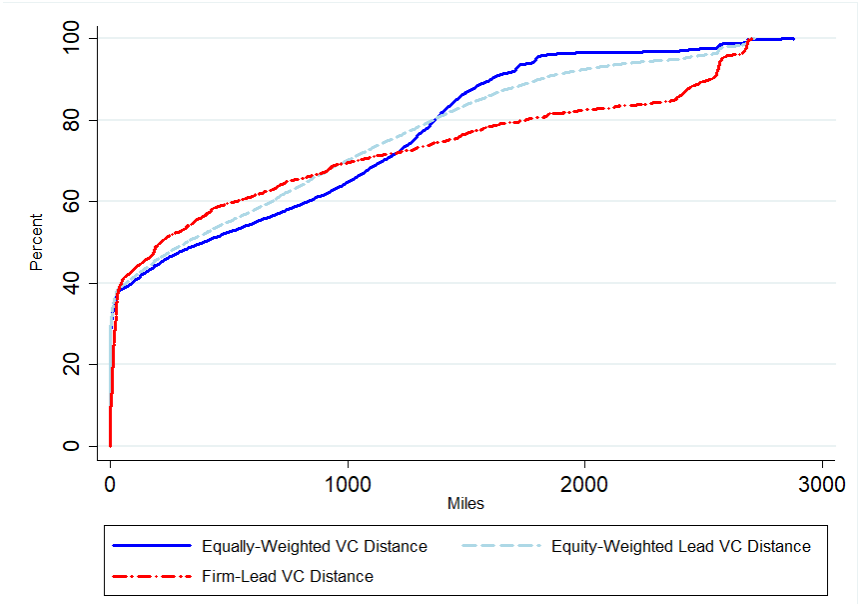

Table 1
Summary Statistics

This table presents summary statistics for entrepreneurial firms in the U.S. with venture capital (VC) investment for the period of 1995-2015. The sample consists of 45,604 financing round observations for 10,594 start-up firms. *Ew Distances* is the logarithm of one plus the equally weighted physical distance (in miles) between all of a firm's VC investor pairs. *Firm-Lead VC Distances* is the logarithm of one plus the physical distance between the portfolio firm and its lead VC investor. *Lead Vw Distances (Equity)* is the logarithm of one plus the cumulative investment amount-weighted physical distance between a lead VC investor and the other VC investors. *Lead Vw Distances (Portfolio)* is the logarithm of one plus the portfolio share-weighted physical distance between a lead VC investor and the other VC investors. *Number of States* is the number of unique states in which VC investors are headquartered. *Vw Distances (Equity)* is the logarithm of one plus the cumulative investment amount-weighted physical distance between all of a firm's VC investor pairs. *Vw Distances (Portfolio)* is the logarithm of one plus the portfolio share-weighted physical distance between all of a firm's VC investor pairs. The numbers in parentheses are the distances in miles. Appendix B provides detailed descriptions of other variables.

Variable	Mean	Std. Dev.	25th	Median	75th	Obs.
Distance characteristics						
Ew Distances	4.39	3.11	0.00	6.02	7.16	45,604
	(665)	(710)	(0.00)	(410)	(1,280)	45,604
Firm-Lead VC Distances	4.81	2.57	2.68	5.34	7.26	45,604
	(756)	(948)	(13.53)	(208)	(1,426)	45,604
Lead Vw Distances (Equity)	4.32	3.12	0.00	5.81	7.07	45,604
	(662)	(769)	(0.00)	(332)	(1,177)	45,604
Lead Vw Distances (Portfolio)	4.29	3.11	0.00	5.70	7.06	45,604
	(659)	(788)	(0.00)	(299)	(1,164)	45,604
Number of States	2.24	1.42	1.00	2.00	3.00	45,604
Vw Distances (Equity)	4.36	3.11	0.00	5.94	7.11	45,604
	(651)	(710)	(0.00)	(378)	(1,229)	45,604
Vw Distances (Portfolio)	4.34	3.10	0.00	5.87	7.09	45,604
	(637)	(709)	(0.00)	(354)	(1,194)	45,604
Airline shock characteristics						
Lead VC Reduction in Travel Time (indicator)	0.07	0.25	0.00	0.00	0.00	45,604
Non-Lead VC Reduction in Travel Time (indicator)	0.05	0.22	0.00	0.00	0.00	45,604
Pre-2005 Reduction in Travel Time (indicator)	0.05	0.21	0.00	0.00	0.00	45,604
Post-2005 Reduction in Travel Time (indicator)	0.07	0.25	0.00	0.00	0.00	45,604
Log (1 + Reduced Travel Time)	0.09	0.39	0.00	0.00	0.00	45,604
Reduction in Travel Time (indicator)	0.11	0.32	0.00	0.00	0.00	45,604
Reduction in Travel Time_Firm (indicator)	0.10	0.30	0.00	0.00	0.00	10,458
VC financing characteristics						
Early Stage (indicator)	0.72	0.45	0.00	1.00	1.00	45,604
Number of Investors	6.07	4.90	3.00	5.00	8.00	45,604
Log (1 + Convertible Amt.)	0.83	1.10	0.00	0.00	1.63	45,604
Log (1 + Duration between Two Financing Rounds)	2.66	1.07	1.93	2.58	3.22	45,604
Log (1 + Number of Financing Rounds)	1.42	0.54	1.1	1.39	1.79	45,604
Log (1 + Total Funding)	2.76	1.24	1.87	2.81	3.67	45,604
Log (1 + Total Funding at Round One)	1.63	0.92	0.92	1.61	2.20	45,604
Log (VC Investor Age)	2.32	0.93	1.86	2.48	2.95	45,604
Log (Total Equity Investment by VC Investors)	5.33	1.82	4.05	5.48	6.79	45,604
Log (Total Rounds VC Investors Participated)	4.52	1.49	3.50	4.69	5.68	45,604
Ratio of Convertible Securities	0.43	0.48	0.00	0.00	1.00	45,604
Successive VC Syndication	0.23	0.20	0.09	0.20	0.33	33,971

Table 1 - *Continued*

Variable	Mean	Std. Dev.	25th	Median	75th	Obs.
Firm characteristics						
Being Acquired (indicator, firm-round)	0.03	0.16	0.00	0.00	0.00	45,604
Being Acquired (indicator, firm)	0.10	0.31	0.00	0.00	0.00	45,604
Exit (indicator, firm-round)	0.05	0.22	0.00	0.00	0.00	45,604
Exit (indicator, firm)	0.20	0.40	0.00	0.00	0.00	45,604
Going Public (indicator, firm-round)	0.02	0.15	0.00	0.00	0.00	45,604
Going Public (indicator, firm)	0.10	0.30	0.00	0.00	0.00	45,604
Industry Asset Intangibility (%)	90.16	9.49	81.32	93.40	97.54	45,604
Industry Market/Book Ratio	1.69	2.71	1.26	1.66	1.91	45,604
Industry R&D/Assets Ratio (%)	6.90	5.83	3.04	6.72	8.83	45,604
Log (1 + Firm Age at Round One)	1.06	0.72	0.52	0.94	1.50	45,604
Board Size	7.31	1.99	6.00	7.00	8.00	796
Percent of Independent Directors	0.81	0.11	0.75	0.83	0.88	796
Percent of VC Directors	0.21	0.18	0.07	0.20	0.33	796
IPO characteristics						
Log (IPO Proceeds)	4.23	0.69	3.77	4.26	4.62	519
IPO Underpricing	0.34	0.42	0.05	0.20	0.48	1,008
IPO Valuation (Price to Book)	5.29	3.03	3.16	4.35	6.49	519

Table 2

Distribution of Sample Firms by Firm State and the Venture Capital (VC) Investors' Geographic Distance and Investment Characteristics

This table presents the distribution of sample start-up firms by firm state and the venture capital (VC) investors' geographic distance and investment characteristics. The sample consists of 45,604 financing round observations for 10,594 start-up firms in the U.S. with VC investment for the period of 1995-2015. Specifically, for a firm that eventually goes public or is acquired, we use only its last financing round immediately before an IPO or an acquisition. For other firms, we use observations from the last available financing round. The VC investors' geographic distance (*EW Distances*) and *Firm-Lead VC Distances* are reported in miles. Appendix B provides the detailed variable descriptions.

Firm State	Obs.	Ew Distances	Firm-Lead VC Distances	Number of Rounds	Exit (indicator)	Firm State	Obs.	Ew Distances	Firm-Lead VC Distances	Number of Rounds	Exit (indicator)
Alabama	36	387	852	3.00	0.08	Nebraska	17	523	989	2.47	0.29
Arizona	90	475	1452	3.99	0.17	Nevada	20	514	1340	3.55	0.30
Arkansas	2	313	1239	3.50	0.50	New Hampshire	65	415	547	4.58	0.08
California	4,090	792	869	4.50	0.23	New Jersey	252	563	573	4.00	0.23
Colorado	261	678	952	4.56	0.18	New Mexico	25	515	792	4.24	0.08
Connecticut	162	433	577	4.19	0.19	New York	646	617	725	3.68	0.15
Delaware	12	510	908	4.08	0.17	North Carolina	209	569	731	4.53	0.23
Florida	188	484	1133	3.36	0.19	North Dakota	5	327	841	3.60	0.20
Georgia	261	564	764	4.22	0.20	Ohio	155	355	489	3.45	0.09
Idaho	18	701	1242	2.39	0.17	Oklahoma	15	319	857	3.47	0.20
Illinois	228	504	701	3.57	0.17	Oregon	94	738	1042	4.10	0.17
Indiana	44	412	443	2.95	0.18	Pennsylvania	382	365	418	3.69	0.16
Iowa	17	92	379	2.29	0.18	Rhode Island	27	339	405	3.70	0.11
Kansas	41	306	464	3.44	0.12	South Carolina	23	521	780	3.22	0.13
Kentucky	28	343	337	3.64	0.21	South Dakota	4	180	422	1.75	0.25
Louisiana	20	374	349	3.65	0.05	Tennessee	82	474	615	3.99	0.22
Maine	17	201	470	2.35	0.18	Texas	558	680	918	4.23	0.19
Maryland	296	428	509	3.33	0.15	Utah	85	626	837	3.55	0.13
Massachusetts	1,102	716	699	4.80	0.24	Vermont	11	354	708	5.27	0.09
Michigan	93	382	445	3.66	0.08	Virginia	291	583	694	3.68	0.19
Minnesota	150	587	769	4.05	0.27	Washington	386	755	1012	4.10	0.21
Mississippi	9	414	668	5.33	0.22	West Virginia	4	643	492	1.25	0.25
Missouri	23	570	909	3.74	0.09	Wisconsin	45	322	508	3.56	0.18
Montana	3	286	1233	4.67	0.33	Wyoming	2	507	798	4.00	0.50
						Total	10,594	660	788	4.21	0.20

Table 3
Geographic Concentration of Venture Capital (VC) Investors and Duration of Financing Rounds

This table reports the results from OLS regressions of the duration (investment interval) of each stage of financing for portfolio firms by venture capital (VC) investors on the VC investors' geographic concentrations. The sample consists of 45,604 financing round observations for 10,594 start-up firms with VC investment for the period of 1995-2015. The dependent variable is the logarithm of one plus the duration in months between the current and the next financing (exit time if there is no additional financing) rounds. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log (1 + Duration between Two Financing Rounds)						
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ew Distances		-0.010***					
		(-4.24)					
Vw Distances (Equity)			-0.011***				
			(-4.14)				
Vw Distances (Portfolio)				-0.011***			
				(-4.01)			
Lead Vw Distances (Equity)					-0.011***		
					(-4.34)		
Lead Vw Distances (Portfolio)						-0.011***	
						(-4.34)	
Log (Number of States)							-0.054***
							(-2.63)
Firm-Lead VC Distances	0.003	0.005*	0.005*	0.005*	0.005*	0.005*	0.004
	(0.95)	(1.70)	(1.86)	(1.82)	(1.93)	(1.97)	(1.50)
Number of Investors	-0.015***	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***	-0.012***
	(-7.47)	(-6.98)	(-6.80)	(-6.85)	(-6.80)	(-6.81)	(-4.93)
Log (1 + Total Funding)	0.043***	0.052***	0.053***	0.053***	0.053***	0.053***	0.050***
	(4.53)	(5.18)	(5.34)	(5.30)	(5.37)	(5.36)	(5.31)
Log (1 + Firm Age at Round One)	0.093***	0.091***	0.091***	0.091***	0.091***	0.091***	0.092***
	(10.59)	(10.69)	(10.69)	(10.71)	(10.68)	(10.68)	(10.63)
Log (1 + Total Funding at Round One)	-0.003	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	(-0.27)	(-0.41)	(-0.43)	(-0.42)	(-0.44)	(-0.44)	(-0.45)
Early Stage (indicator)	-0.072***	-0.068***	-0.068***	-0.068***	-0.067***	-0.068***	-0.069***
	(-6.28)	(-5.81)	(-5.74)	(-5.77)	(-5.72)	(-5.74)	(-5.84)
Industry Market/Book Ratio	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**
	(-2.60)	(-2.56)	(-2.56)	(-2.56)	(-2.56)	(-2.56)	(-2.58)
Industry R&D/Assets Ratio	0.006	0.006	0.006	0.006	0.006	0.006	0.006
	(1.49)	(1.47)	(1.47)	(1.47)	(1.47)	(1.47)	(1.48)
Industry Asset Tangibility	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**
	(-2.09)	(-2.13)	(-2.13)	(-2.13)	(-2.13)	(-2.13)	(-2.13)
Log (VC Investor Age)	-0.005	-0.005	-0.006	-0.005	-0.006	-0.006	-0.005
	(-0.52)	(-0.56)	(-0.57)	(-0.56)	(-0.57)	(-0.57)	(-0.52)
Log (Total Equity Investment	0.026	0.024	0.025	0.025	0.025	0.025	0.025
by VC Investors)	(1.19)	(1.12)	(1.13)	(1.13)	(1.13)	(1.13)	(1.13)
Log (Total Rounds VC Investors	0.006	0.008	0.008	0.008	0.008	0.008	0.007
Participated)	(0.23)	(0.31)	(0.30)	(0.30)	(0.31)	(0.30)	(0.26)
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45,604	45,604	45,604	45,604	45,604	45,604	45,604
Adjusted *R*-squared	0.114	0.115	0.115	0.115	0.115	0.115	0.115

Table 4
Geographic Concentration of Venture Capital (VC) Investors and Number of Staged Financing

This table reports the results of OLS regressions of the number of staged financing for portfolio firms by venture capital (VC) investors on VC investors' geographic concentrations. The sample consists of 10,594 final financing round observations for 10,594 start-up firms with VC investment for the period of 1995-2015. Specifically, for a firm that eventually goes public or is acquired, we use only its last financing round immediately before an IPO or an acquisition. For other firms, we use only observations from the last available financing round. The dependent variable is the logarithm of one plus the total number of financing rounds that the entrepreneur firm receives from VC investors. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log (1 + Number of Financing Rounds)						
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ew Distances		0.009***					
		(6.83)					
Vw Distances (Equity)			0.009***				
			(6.48)				
Vw Distances (Portfolio)				0.009***			
				(6.28)			
Lead Vw Distances (Equity)					0.009***		
					(6.63)		
Lead Vw Distances (Portfolio)						0.009***	
						(6.15)	
Log (Number of States)							-0.005
							(-0.65)
Firm-Lead VC Distances	0.001	-0.001	-0.001	-0.001	-0.001	-0.001	0.001
	(0.47)	(-0.61)	(-0.88)	(-0.82)	(-1.02)	(-1.02)	(0.57)
Number of Investors	0.019***	0.018***	0.018***	0.018***	0.018***	0.018***	0.019***
	(14.64)	(14.06)	(13.83)	(13.82)	(13.80)	(13.69)	(13.53)
Log (1 + Total Funding)	0.255***	0.247***	0.247***	0.247***	0.247***	0.248***	0.256***
	(42.13)	(38.65)	(39.11)	(39.12)	(39.22)	(39.14)	(40.19)
Log (1 + Firm Age at Round One)	0.013***	0.015***	0.015***	0.015***	0.015***	0.015***	0.013***
	(3.13)	(3.45)	(3.47)	(3.48)	(3.47)	(3.45)	(3.08)
Log (1 + Total Funding at Round One)	-0.181***	-0.180***	-0.180***	-0.180***	-0.180***	-0.180***	-0.182***
	(-24.44)	(-24.00)	(-24.15)	(-24.18)	(-24.15)	(-24.23)	(-24.92)
Early Stage (indicator)	-0.022***	-0.024***	-0.025***	-0.025***	-0.025***	-0.025***	-0.022***
	(-2.99)	(-3.22)	(-3.25)	(-3.23)	(-3.26)	(-3.25)	(-2.96)
Industry Market/Book Ratio	0.004	0.004	0.004	0.004	0.004	0.004	0.004
	(0.77)	(0.78)	(0.78)	(0.78)	(0.78)	(0.78)	(0.76)
Industry R&D/Assets Ratio	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***
	(2.78)	(2.75)	(2.74)	(2.75)	(2.74)	(2.74)	(2.78)
Industry Asset Tangibility	-0.008*	-0.008*	-0.008*	-0.008*	-0.008*	-0.008*	-0.008*
	(-1.96)	(-1.95)	(-1.95)	(-1.96)	(-1.95)	(-1.95)	(-1.97)
Log (VC Investor Age)	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***	-0.014***
	(-6.48)	(-6.23)	(-6.23)	(-6.22)	(-6.23)	(-6.25)	(-6.49)
Log (Total Equity Investment	-0.121***	-0.118***	-0.118***	-0.119***	-0.118***	-0.119***	-0.122***
by VC Investors)	(-6.55)	(-6.28)	(-6.35)	(-6.35)	(-6.34)	(-6.35)	(-6.53)
Log (Total Rounds VC Investors	0.354***	0.349***	0.349***	0.349***	0.349***	0.349***	0.354***
Participated)	(15.84)	(15.64)	(15.66)	(15.66)	(15.68)	(15.72)	(15.87)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10,594	10,594	10,594	10,594	10,594	10,594	10,594
Adjusted *R*-squared	0.710	0.711	0.711	0.711	0.711	0.711	0.710

Table 5
Geographic Concentration of Venture Capital (VC) Investors and Use of Convertible Securities

This table reports the results from OLS regressions of the ratio of convertible securities used by venture capital (VC) investors in VC firm funding. The sample consists of 45,604 financing round observations for 10,594 start-up firms with VC investment for the period of 1995-2015. The dependent variable is the ratio of the amount of convertible debt and convertible preferred stock to the total funding amount in each financing round (*Ratio of Convertible Securities*). Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Ratio of Convertible Securities						
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ew Distances		0.009***					
		(7.60)					
Vw Distances (Equity)			0.009***				
			(7.65)				
Vw Distances (Portfolio)				0.009***			
				(7.40)			
Lead Vw Distances (Equity)					0.009***		
					(8.10)		
Lead Vw Distances (Portfolio)						0.009***	
						(7.96)	
Log (Number of States)							0.050***
							(6.82)
Firm-Lead VC Distances	0.003***	0.001	0.001	0.001	0.001	0.001	0.002*
	(3.65)	(1.46)	(1.20)	(1.29)	(1.03)	(1.01)	(1.89)
Number of Investors	0.008***	0.007***	0.007***	0.007***	0.007***	0.007***	0.005***
	(10.11)	(7.88)	(7.82)	(7.89)	(7.85)	(7.92)	(6.16)
Log (1 + Total Funding)	0.053***	0.045***	0.044***	0.045***	0.045***	0.045***	0.046***
	(9.60)	(7.79)	(7.70)	(7.70)	(7.76)	(7.78)	(8.36)
Log (1 + Firm Age at Round One)	-0.021***	-0.020***	-0.020***	-0.020***	-0.020***	-0.020***	-0.021***
	(-5.89)	(-5.52)	(-5.48)	(-5.48)	(-5.47)	(-5.48)	(-5.72)
Log (1 + Total Funding at Round One)	0.072***	0.068***	0.068***	0.068***	0.068***	0.068***	0.069***
	(9.77)	(9.44)	(9.45)	(9.42)	(9.45)	(9.41)	(9.33)
Early Stage (indicator)	-0.000***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(-2.63)	(-3.09)	(-3.12)	(-3.11)	(-3.10)	(-3.10)	(-3.05)
Industry Market/Book Ratio	-0.003**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**
	(-2.14)	(-2.09)	(-2.08)	(-2.08)	(-2.09)	(-2.10)	(-2.10)
Industry R&D/Assets Ratio	-0.001	-0.001	-0.000	-0.001	-0.000	-0.000	-0.001
	(-0.90)	(-0.80)	(-0.79)	(-0.80)	(-0.78)	(-0.79)	(-0.80)
Industry Asset Tangibility	-0.024***	-0.022***	-0.022***	-0.022***	-0.022***	-0.022***	-0.022***
	(-4.99)	(-4.64)	(-4.63)	(-4.66)	(-4.61)	(-4.62)	(-4.80)
Log (VC Investor Age)	-0.039***	-0.041***	-0.041***	-0.041***	-0.041***	-0.041***	-0.040***
	(-3.49)	(-3.51)	(-3.50)	(-3.51)	(-3.51)	(-3.51)	(-3.50)
Log (Total Equity Investment	0.012	0.014	0.014	0.014	0.014	0.013	0.013
by VC Investors)	(1.23)	(1.31)	(1.29)	(1.29)	(1.29)	(1.29)	(1.29)
Log (Total Rounds VC Investors	-0.003	-0.002	-0.002	-0.002	-0.002	-0.002	-0.003
Participated)	(-1.05)	(-0.96)	(-0.95)	(-0.98)	(-0.94)	(-0.95)	(-1.11)
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45,604	45,604	45,604	45,604	45,604	45,604	45,604
Adjusted *R*-squared	0.243	0.245	0.245	0.245	0.245	0.245	0.245

Table 6
Geographic Concentration of Venture Capital (VC) Investors and Proportion of Directors Who Are Representatives of VC Investors on the Board: Firm-level Analyses

This table reports the results from OLS regressions of the proportion of directors affiliated with VC investors (*VC Directors*) on start-up-firm boards. The sample consists of 796 going-public start-up firms in the U.S. with VC investment for the period of 1995-2015. The dependent variable is the ratio of the number of *VC directors* to the total number of directors on the board in the IPO year. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Percent of VC Directors						
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ew Distances		0.016**					
		(2.22)					
Vw Distances (Equity)			0.015**				
			(2.30)				
Vw Distances (Portfolio)				0.015**			
				(2.20)			
Lead Vw Distances (Equity)					0.015**		
					(2.41)		
Lead Vw Distances (Portfolio)						0.015**	
						(2.06)	
Log (Number of States)							0.044
							(1.14)
Firm-Lead VC Distances	-0.000	-0.002	-0.002	-0.002	-0.003	-0.003	-0.002
	(-0.00)	(-0.19)	(-0.21)	(-0.17)	(-0.28)	(-0.26)	(-0.16)
Number of Investors	0.004	0.001	0.001	0.002	0.001	0.001	0.002
	(1.10)	(0.31)	(0.35)	(0.36)	(0.35)	(0.32)	(0.62)
Log (1 + Total Funding)	0.021	0.020	0.019	0.020	0.020	0.021	0.015
	(0.78)	(0.69)	(0.67)	(0.69)	(0.67)	(0.70)	(0.51)
Log (1 + Firm Age at Round One)	-0.014	-0.015	-0.015	-0.015	-0.014	-0.015	-0.014
	(-0.21)	(-0.23)	(-0.23)	(-0.23)	(-0.22)	(-0.22)	(-0.21)
Log (1 + Total Funding at Round One)	0.000	-0.002	-0.002	-0.002	-0.002	-0.002	0.004
	(0.01)	(-0.05)	(-0.06)	(-0.05)	(-0.07)	(-0.05)	(0.10)
Early Stage (indicator)	-0.039	-0.041	-0.042	-0.042	-0.041	-0.040	-0.038
	(-1.22)	(-1.17)	(-1.19)	(-1.17)	(-1.17)	(-1.12)	(-1.10)
Industry Market/Book Ratio	-0.008	-0.015	-0.014	-0.014	-0.015	-0.014	-0.008
	(-0.18)	(-0.38)	(-0.35)	(-0.34)	(-0.36)	(-0.35)	(-0.20)
Industry R&D/Assets Ratio	0.008	0.007	0.007	0.008	0.007	0.008	0.008
	(0.94)	(0.63)	(0.64)	(0.66)	(0.65)	(0.69)	(0.77)
Industry Asset Tangibility	0.002	0.003	0.002	0.002	0.002	0.002	0.002
	(0.28)	(0.38)	(0.36)	(0.36)	(0.37)	(0.36)	(0.33)
Log (VC Investor Age)	-0.011	-0.003	-0.004	-0.002	-0.004	-0.005	-0.011
	(-0.11)	(-0.03)	(-0.04)	(-0.03)	(-0.05)	(-0.06)	(-0.12)
Log (Total Equity Investment	0.024	0.028	0.029	0.026	0.030	0.030	0.028
by VC Investors)	(0.23)	(0.32)	(0.33)	(0.29)	(0.32)	(0.32)	(0.29)
Log (Total Rounds VC Investors	-0.000	-0.002	-0.002	-0.002	-0.003	-0.003	-0.002
Participated)	(-0.00)	(-0.19)	(-0.21)	(-0.17)	(-0.28)	(-0.26)	(-0.16)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exit Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	796	796	796	796	796	796	796
Adjusted *R*-squared	0.179	0.206	0.204	0.202	0.203	0.202	0.181

Table 7
Geographic Concentration of Venture Capital (VC) Investors and Successive VC Syndication

This table reports the results from OLS regressions of the proportion of existing VC investors who participate in a follow-up round of syndication. The sample consists of 33,400 financing round observations for 8,983 start-up firms with VC investment for the period of 1995-2015. The dependent variable is the ratio of the number of existing VC investors that participate in both the current and previous syndication rounds to the total number of VC investors in the previous syndication (*Successive VC Syndication*). Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Successive VC Syndication						
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ew Distances		-0.009***					
		(-8.43)					
Vw Distances (Equity)			-0.009***				
			(-8.67)				
Vw Distances (Portfolio)				-0.009***			
				(-8.73)			
Lead Vw Distances (Equity)					-0.009***		
					(-8.70)		
Lead Vw Distances (Portfolio)						-0.009***	
						(-8.74)	
Log (Number of States)							-0.020***
							(-4.90)
Firm-Lead VC Distances	-0.001	0.001*	0.001**	0.001*	0.002**	0.002**	0.000
	(-0.81)	(1.86)	(1.98)	(1.90)	(2.34)	(2.47)	(0.22)
Number of Investors	-0.009***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***	-0.008***
	(-10.95)	(-8.79)	(-8.80)	(-8.90)	(-8.75)	(-8.78)	(-9.14)
Log (1 + Total Funding)	0.015***	0.021***	0.021***	0.021***	0.021***	0.021***	0.018***
	(4.58)	(7.12)	(7.05)	(7.10)	(7.01)	(6.99)	(5.74)
Log (1 + Firm Age at Round One)	0.001	0.000	-0.000	-0.000	-0.000	0.000	0.001
	(0.33)	(0.01)	(-0.02)	(-0.03)	(-0.02)	(0.01)	(0.33)
Log (1 + Total Funding at Round One)	-0.004	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
	(-1.33)	(-1.51)	(-1.53)	(-1.50)	(-1.54)	(-1.54)	(-1.53)
Early Stage (indicator)	-0.000	0.003	0.003	0.003	0.003	0.003	0.001
	(-0.00)	(0.78)	(0.78)	(0.76)	(0.83)	(0.81)	(0.26)
Industry Market/Book Ratio	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.14)	(0.22)	(0.22)	(0.20)	(0.21)	(0.21)	(0.16)
Industry R&D/Assets Ratio	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.15)	(-0.19)	(-0.20)	(-0.21)	(-0.20)	(-0.19)	(-0.17)
Industry Asset Tangibility	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.36)	(-0.51)	(-0.51)	(-0.50)	(-0.52)	(-0.52)	(-0.44)
Log (VC Investor Age)	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***	0.009***
	(5.42)	(5.18)	(5.16)	(5.11)	(5.21)	(5.11)	(5.41)
Log (Total Equity Investment	-0.010*	-0.010*	-0.010*	-0.010*	-0.010*	-0.010*	-0.010*
by VC Investors)	(-1.79)	(-1.94)	(-1.93)	(-1.92)	(-1.96)	(-1.92)	(-1.89)
Log (Total Rounds VC Investors	0.030***	0.029***	0.029***	0.029***	0.029***	0.029***	0.030***
Participated)	(4.66)	(4.72)	(4.73)	(4.72)	(4.75)	(4.71)	(4.68)
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33,400	33,400	33,400	33,400	33,400	33,400	33,400
Adjusted *R*-squared	0.278	0.286	0.286	0.286	0.286	0.286	0.279

Table 8
Geographic Concentration of Venture Capital (VC) Investors and Likelihood of Going Public and Being Acquired

This table reports the results from linear probability model regressions in which the dependent variable is an indicator that takes the value of one if the firm goes public via an IPO or is acquired with a deal value greater than $25 million, and zero otherwise (*Exit*). The sample consists of 45,604 financing round observations for 10,594 start-up firms with VC investment for the period of 1995-2015. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Exit (indicator)						
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ew Distances		-0.001**					
		(-2.15)					
Vw Distances (Equity)			-0.001**				
			(-2.17)				
Vw Distances (Portfolio)				-0.001**			
				(-2.28)			
Lead Vw Distances (Equity)					-0.001**		
					(-2.05)		
Lead Vw Distances (Portfolio)						-0.001*	
						(-1.90)	
Log (Number of States)							-0.006**
							(-2.01)
Firm-Lead VC Distances	-0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(-0.28)	(0.08)	(0.12)	(0.11)	(0.13)	(0.11)	(0.02)
Number of Investors	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(3.95)	(4.10)	(4.11)	(4.11)	(4.10)	(4.07)	(4.32)
Log (1 + Total Funding)	0.027***	0.028***	0.028***	0.028***	0.028***	0.028***	0.027***
	(8.36)	(8.09)	(8.09)	(8.10)	(8.07)	(8.02)	(8.13)
Log (1 + Firm Age at Round One)	0.002	0.002	0.002	0.002	0.002	0.002	0.002
	(1.18)	(1.09)	(1.08)	(1.08)	(1.08)	(1.09)	(1.14)
Log (1 + Total Funding at Round One)	0.004	0.003	0.003	0.003	0.003	0.003	0.003
	(1.55)	(1.46)	(1.45)	(1.46)	(1.46)	(1.47)	(1.47)
Early Stage (indicator)	-0.021***	-0.020***	-0.020***	-0.020***	-0.020***	-0.020***	-0.020***
	(-5.98)	(-5.84)	(-5.84)	(-5.85)	(-5.85)	(-5.86)	(-5.96)
Industry Market/Book Ratio	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.78)	(0.82)	(0.82)	(0.82)	(0.81)	(0.81)	(0.80)
Industry R&D/Assets Ratio	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**	-0.002**
	(-2.23)	(-2.24)	(-2.24)	(-2.24)	(-2.24)	(-2.24)	(-2.23)
Industry Asset Tangibility	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.65)	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)	(0.64)
Log (VC Investor Age)	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
	(-1.55)	(-1.56)	(-1.57)	(-1.56)	(-1.57)	(-1.56)	(-1.54)
Log (Total Equity Investment	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003
by VC Investors)	(-0.49)	(-0.52)	(-0.52)	(-0.52)	(-0.52)	(-0.51)	(-0.51)
Log (Total Rounds VC Investors	-0.002	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
Participated)	(-0.25)	(-0.21)	(-0.22)	(-0.22)	(-0.22)	(-0.22)	(-0.23)
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45,604	45,604	45,604	45,604	45,604	45,604	45,604
Adjusted *R*-squared	0.068	0.068	0.068	0.068	0.068	0.068	0.068

Table 9
Geographic Concentration of Venture Capital (VC) Investors and IPO Underpricing and Valuation

This table reports the results from OLS regressions of the first-day IPO return and IPO valuation. In Panel A, the sample consists of 1,008 IPO firms with VC investments for the period of 1995-2015. The dependent variable is the return on the first trading day (first-day closing price / IPO offer price). In Panel B, the sample consists of 519 IPO firms with VC investments for the period of 1995-2015. The dependent variable is the ratio of the first-trading-day closing price to the book value of equity per share after the IPO. All distance and control variables are measured using the previous cumulative financing rounds' characteristics. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. IPO Underpricing

	IPO Underpricing						
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ew Distances		0.026**					
		(2.08)					
Vw Distances (Equity)			0.024*				
			(1.92)				
Vw Distances (Portfolio)				0.025**			
				(2.06)			
Lead Vw Distances (Equity)					0.026**		
					(2.02)		
Lead Vw Distances (Portfolio)						0.026**	
						(2.07)	
Log (Number of States)							-0.012
							(-0.15)
Firm-Lead VC Distances	-0.016	-0.019	-0.019	-0.019	-0.021	-0.021	-0.016
	(-0.65)	(-0.73)	(-0.74)	(-0.74)	(-0.81)	(-0.81)	(-0.64)
Firm and Lead VC controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exit Year & First Financing Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,008	1,008	1,008	1,008	1,008	1,008	1,008
Adjusted *R*-squared	0.224	0.236	0.234	0.235	0.237	0.237	0.220

Panel B. IPO Valuation (Price to Book)

	IPO Valuation (Price to Book)						
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ew Distances		-0.886***					
		(-3.36)					
Vw Distances (Equity)			-0.910***				
			(-3.26)				
Vw Distances (Portfolio)				-1.024***			
				(-2.99)			
Lead Vw Distances (Equity)					-0.908**		
					(-2.36)		
Lead Vw Distances (Portfolio)						-0.948	
						(-1.57)	
Log (Number of States)							-4.067**
							(-2.24)
Firm-Lead VC Distances	-0.781	-0.725***	-0.760***	-0.690***	-0.685***	-0.676***	-0.941**
	(-0.90)	(-3.06)	(-3.48)	(-3.59)	(-4.14)	(-4.51)	(-2.24)
Firm and Lead VC controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry & Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exit Year & First Financing Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	519	519	519	519	519	519	519
Adjusted *R*-squared	0.146	0.313	0.314	0.313	0.302	0.274	0.202

Table 10
Endogeneity Tests: Using the Introduction of New Direct Airline Routes as a Natural Experiment

This table reports the results from OLS (columns (1), (2), and (3)) and linear probability model (column (4)) regressions of venture capital (VC) investors' financing terms, the proportion of existing VC investors that participate in a follow-up round of syndication, and VC firms' exit performance using the introduction of new direct airline routes that reduce the travel time between VC investors as an exogenous shock to geographic distance. The sample consists of 45,604 financing round observations for 10,594 start-up firms with VC investment for the period of 1995-2015. In columns (1) and (2), the dependent variables are the logarithm of one plus the duration in months between the current and next financing (exit time if there is no additional financing) rounds and the ratio of the amount of convertible debt and convertible preferred stock to the total funding amount in each financing round (*Ratio of Convertible Securities*), respectively. In column (3), the dependent variable is the ratio of the number of existing VC investors that participate in both the current and previous syndication rounds to the total number of VC investors in the previous syndication (*Successive VC Syndication*). In column (4), the dependent variable is an indicator that takes the value of one if the firm goes public via an IPO or is acquired with a deal value greater than $25 million during the sample period, and zero otherwise (*Exit*). *Reduction in Travel Time* is an indicator that takes a value of one if the VC investors experience a reduction in travel time between the current and next financing rounds of more than a half hour due to the introduction of new direct airline routes, and zero otherwise. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.316***	-0.044***	0.014***	0.053***
	(20.44)	(-4.85)	(4.72)	(10.99)
Firm-Lead VC Distances	0.001	0.003***	-0.001	-0.001
	(0.18)	(3.77)	(-0.91)	(-0.84)
Number of Investors	-0.023***	0.009***	-0.009***	0.001
	(-10.83)	(11.34)	(-11.00)	(1.32)
Log (1 + Total Funding)	0.045***	0.052***	0.015***	0.027***
	(4.79)	(9.35)	(4.62)	(8.75)
Log (1 + Firm Age at Round One)	0.090***	-0.021***	0.001	0.002
	(9.84)	(-5.78)	(0.28)	(0.96)
Log (1 + Total Funding at Round One)	-0.074***	0.072***	-0.000	-0.021***
	(-6.44)	(9.84)	(-0.02)	(-6.24)
Early Stage (indicator)	-0.004**	-0.000***	0.000	0.000
	(-2.50)	(-2.74)	(0.18)	(0.99)
Industry Market/Book Ratio	0.007*	-0.003**	-0.000	-0.002**
	(1.80)	(-2.22)	(-0.12)	(-2.08)
Industry R&D/Assets Ratio	-0.005**	-0.001	-0.000	0.000
	(-2.24)	(-0.83)	(-0.42)	(0.55)
Industry Asset Tangibility	-0.003	-0.023***	-0.004	0.004
	(-0.31)	(-4.78)	(-1.35)	(1.45)
Log (VC Investor Age)	0.011	-0.041***	0.031***	-0.001
	(0.39)	(-3.60)	(4.68)	(-0.13)
Log (Total Equity Investment	0.023	0.013	-0.010*	-0.003
by VC Investors)	(1.07)	(1.31)	(-1.83)	(-0.58)
Log (Total Rounds VC	-0.007	-0.003	0.009***	-0.002*
Investors Participated)	(-0.69)	(-0.96)	(5.43)	(-1.84)
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,604	45,604	33,400	45,604
Adjusted *R*-squared	0.121	0.244	0.278	0.072

Table 11
Additional Tests of Endogeneity

This table reports the results from OLS (columns (1), (2), and (3)) and linear probability model (column (4)) regressions of the venture capital (VC) investors' financing terms, the proportion of existing VC investors that participate in a follow-up round of syndication, and the VC firms' exit performance using the introduction of new direct airline routes that reduce the travel time between VC investors (*airline shock*) as an exogenous shock to geographic distance. In Panel A, the sample consists of 8,634 financing round observations for 3,615 start-up firms with VC investment for the period of 1995-2015. We match the control firm that does not experience the introduction of a new direct airline route based on the predicted probability of being treated. We use as matching variables *Ew Distances*, *Firm-Lead VC Distance*, the same set of control variables in Table 11, including the cumulative number of VC investors and total funding, funding characteristics in the first round of VC investment, industry characteristics, VC investor reputation measures, and industry, year, first financing year, firm state, and lead VC investor fixed effects. In Panels B, C, E and F, the sample consists of 45,604 financing round observations for 10,594 start-up firms with VC investment for the period of 1995-2015. In Panel D, the sample consists of 26,883 financing round observations for 7,438 start-up firms that are not headquartered in California and have VC investment for the period of 1995-2015. The dependent variables are identical to those in Table 11. *Reduction in Travel Time* is an indicator that takes a value of one if VC investors experience a reduction in travel time between the current and next financing rounds of more than a half hour due to the introduction of new direct airline routes, and zero otherwise. In Panel B, we separate *Reduction in Travel Time* into the following two indicators: *Lead VC Reduction in Travel Time*, which takes the value of one if the treatment is associated with a travel time reduction for lead VC investors, and zero otherwise; and *Non-Lead VC Reduction in Travel Time*, which takes a value of one if the treatment is associated with a travel time reduction for nonlead VC investors, and zero otherwise. In Panel C, we treat an *airline shock* with a distance reduction less than 200 km as no shock (i.e., zero value for *Reduction in Travel Time*). In Panel D, we exclude portfolio firms headquartered in California from the sample**.** In Panels E and F, we include firm state-year fixed effects and financing round fixed effects, respectively. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Using a Propensity Score Matching Approach

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.345***	-0.041***	0.009**	0.065***
	(16.56)	(-3.50)	(2.11)	(7.94)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	8,634	8,634	8,363	8,634
Adjusted *R*-squared	0.112	0.209	0.219	0.089

Panel B. Decomposing *Reduction in Travel Time* into *Lead VC Reduction in Travel Time* and *Non-Lead VC Reduction in Travel Time*

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Lead VC Reduction in Travel Time: a	0.364***	-0.053***	0.022***	0.061***
	(17.87)	(-3.22)	(9.20)	(12.65)
Non-Lead VC Reduction in Travel Time: b	0.251***	-0.014	0.030***	0.043***
	(7.88)	(-1.17)	(6.34)	(5.24)
P-value for the test of the difference in coefficients between (a) and (b)	0.008***	0.079*	0.039**	0.040**
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,604	45,604	33,400	45,604
Adjusted *R*-squared	0.121	0.245	0.279	0.072

Panel C. Treating *Airline Shock* with a Distance Less Than 200 km as No Shock

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.322***	-0.045***	0.013***	0.053***
	(18.68)	(-4.81)	(4.24)	(10.77)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,604	45,604	33,400	45,604
Adjusted *R*-squared	0.121	0.244	0.278	0.072

Panel D. Excluding Portfolio Firms Headquartered in California

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.331***	-0.055***	0.016***	0.056***
	(15.11)	(-3.12)	(3.58)	(7.93)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	26,883	26,883	19,312	26,883
Adjusted *R*-squared	0.135	0.246	0.317	0.087

Panel E. Controlling for Firm State-Year Fixed Effects

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.318***	-0.043***	0.015***	0.055***
	(20.68)	(-4.53)	(4.89)	(11.01)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Firm State-Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,515	45,515	33,295	45,515
Adjusted *R*-squared	0.123	0.247	0.284	0.073

Panel F. Controlling for Financing Round Fixed Effects

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.312***	-0.043***	0.017***	0.053***
	(19.52)	(-5.55)	(5.18)	(10.85)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Financing Round Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,604	45,604	33,398	45,604
Adjusted *R*-squared	0.124	0.259	0.282	0.072

Appendix A

Table A.1
Tests of Multicollinearity

This table reports the results from OLS (columns (1), (2), and (3)) and linear probability model (column (4)) regressions of the venture capital (VC) investors' financing terms, the proportion of existing VC investors that participate in a follow-up round of syndication, and the VC firms' exit performance. The sample consists of 45,604 financing round observations for 10,594 start-up firms with VC investment for the period of 1995-2015. In Panels A and B, the sample is divided into two groups according to the sample median *Firm-Lead VC Distances*. Panel A (B) presents results for the subsample of firms with high (low) *Firm-Lead VC Distances*. In Panel C, we exclude the variable *Firm-Lead VC Distances* from the regression. The dependent variables are identical to those in Table 11. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Using the Subsample of Firms with Large *Firm-Lead VC Distances*

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Ew Distances	-0.015***	0.008***	-0.012***	-0.001**
	(-5.32)	(5.07)	(-12.04)	(-2.18)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	22,394	22,394	16,531	22,394
Adjusted *R*-squared	0.111	0.250	0.346	0.071

Panel B. Using the Subsample of Firms with Small *Firm-Lead VC Distances*

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Ew Distances	-0.005	0.009***	-0.005***	-0.001**
	(-1.58)	(8.09)	(-5.02)	(-2.41)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	22,475	22,475	16,366	22,475
Adjusted *R*-squared	0.126	0.265	0.308	0.073

Panel C. Excluding the Variable *Firm-Lead VC Distances* from the Regressions

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Ew Distances	-0.009***	0.009***	-0.008***	-0.001**
	(-3.94)	(8.17)	(-8.39)	(-2.29)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,604	45,604	33,400	45,604
Adjusted *R*-squared	0.115	0.245	0.286	0.068

Table A.2
Descriptive Statistics for the Propensity Score-Matched Sample

This table presents the mean statistics for a propensity score-matched sample. The sample consists of 9,446 financing round observations (4,723 treated financing rounds and 4,723 control financing rounds) with venture capital (VC) investment for the period of 1995-2015. We obtain the control sample by estimating the probability of having an airline shock, using as the independent variables *Ew Distances*, *Firm-Lead VC Distances*, the same set of control variables used in Table 11, and industry, year, first financing year, firm state, and lead VC investor fixed effects. We then use the predicted probability to match, without replacement, a treated financing round with a control financing round that has the closest propensity score using a caliper of 0.01. The significance in the test-of-difference column is based on the *t*-tests for equality of means. Appendix B provides the detailed variable descriptions. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Treated Sample: A	Control Sample: B	Test of difference: (A - B)
Variable	Mean	Mean	*t*-statistics
Ew Distances	6.87	6.89	-1.02
Firm-Lead VC Distances	5.54	5.53	0.14
Number of Investors	10.81	10.84	-0.23
Log (1 + Total Funding)	3.71	3.73	-1.06
Log (1 + Firm Age at Round One)	1.01	1.03	-1.39
Log (1 + Total Funding at Round One)	0.76	0.75	1.39
Early Stage (indicator)	1.69	1.71	-0.82
Industry Market/Book Ratio	7.46	7.53	-0.49
Industry R&D/Assets Ratio	90	90.24	-1.33
Industry Asset Tangibility	1.75	1.77	-1.00
Log (VC Investor Age)	4.92	4.9	0.61
Log (Total Equity Investment by VC Investors)	5.95	5.92	0.88
Log (Total Rounds VC Investors Participated)	2.36	2.36	-0.16
Log (IPO Proceeds)	6.87	6.89	-1.02

Table A.3
Endogeneity of the Geographic Concentration of Venture Capital (VC) Investors: Additional Tests

This table reports the results from OLS (columns (1), (2), and (3)) and linear probability model (column (4)) regressions of the venture capital (VC) investors' financing terms, the proportion of existing VC investors that participate in a follow-up round of syndication, and the VC firms' exit performance using the introduction of new direct airline routes that reduce the travel time between VC investors (*airline shock*) as an exogenous shock to geographic distance. The sample consists of 45,604 financing round observations for 10,594 start-up firms with VC investment for the period of 1995-2015. The dependent variables are identical to those in Table 11. In Panel A, we include the interactions of firm and VC-first round characteristics with year fixed effects, and in Panel B, we include lead VC investor-MSA-year fixed effects. In Panel C, we use the logarithm of one plus the average reduced travel time between the treated VC investor pairs for each firm-round observation (*Log (1 + Reduced Travel Time)*) as the measure of a shock to VC investors' geographic concentration. In Panel D, we use only the eventually treated firms (i.e., firms that are treated at least once during our sample period) as the treatment and control samples. In Panel E, we separate *Reduction in Travel Time* into the following two indicators: *Pre-2005 Reduction in Travel Time* and *Post-2005 Reduction in Travel Time*, which take the value of one if any VC investor pair is treated before and after 2005, respectively, and zero otherwise. In Panel F, we exclude firms located in the same cities as any of their VC investors. Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Controlling for Heterogeneous Time Trends by Interacting the Firm and VC-first Round Characteristics with Year Fixed Effects

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.326***	-0.046***	0.012***	0.054***
	(20.06)	(-5.21)	(3.89)	(10.43)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
First Round Characteristics*Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,047	45,047	32,870	45,047
Adjusted *R*-squared	0.124	0.250	0.289	0.075

Panel B. Controlling for Lead VC Investor-MSA-Year Fixed Effects

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.348***	-0.042***	0.011***	0.059***
	(15.76)	(-3.39)	(3.40)	(9.93)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Lead VC MSA-Year Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	36,915	36,915	26,415	36,915
Adjusted *R*-squared	0.134	0.306	0.287	0.057

Panel C. Using the Average Reduction in Travel Time as a Shock to the VC Investors' Geographic Concentration

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Log (1 + Reduced Travel Time)	0.153***	-0.020***	0.003	0.023***
	(11.17)	(-3.21)	(0.78)	(3.87)
Firm and Lead VC controls	Yes	Yes	Yes	Yes

Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,604	45,604	33,400	45,604
Adjusted *R*-squared	0.117	0.244	0.278	0.069

Panel D. Using the Eventually Treated Sample Only

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.511***	-0.047***	0.011**	0.111***
	(19.63)	(-4.93)	(2.54)	(13.65)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	13,887	13,887	11,535	13,887
Adjusted *R*-squared	0.131	0.246	0.246	0.097

Panel E. Decomposing *Reduction in Travel Time* into *Pre-2005 Reduction in Travel Time* and *Post-2005 Reduction in Travel Time*

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Pre-2005 Reduction in Travel Time: a	0.413***	-0.074***	0.026***	0.073***
	(13.28)	(-5.38)	(4.52)	(9.96)
Post-2005 Reduction in Travel Time: b	0.247***	-0.032**	0.009**	0.039***
	(13.63)	(-2.38)	(2.55)	(8.24)
P-value for the test of the difference in coefficients between (a) and (b)	0.000***	0.051***	0.021**	0.000***
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,604	45,604	33,400	45,604
Adjusted *R*-squared	0.121	0.244	0.278	0.073

Panel F. Excluding Firms Located in the Same Cities as Any of Their VC Investors from the Sample

	Log (1 + Duration between Two Financing Rounds)	Ratio of Convertible Securities	Successive VC Syndication	Exit (indicator)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time	0.310***	-0.039***	0.015***	0.057***
	(17.72)	(-4.37)	(4.42)	(10.00)
Firm and Lead VC controls	Yes	Yes	Yes	Yes
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
First Financing Year Fixed Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	36,572	36,572	26,169	36,572
Adjusted *R*-squared	0.129	0.257	0.308	0.073

Table A.4
Endogeneity of the Geographic Concentration of Venture Capital (VC) Investors: Cross-sectional Tests

This table reports the results from OLS regressions of the number of staged financing for portfolio firms, the proportion of directors affiliated with VC investors (*VC Directors*) on start-up-firm boards, the first-day IPO return, and IPO valuation using the introduction of new direct airline routes that reduce the travel time between VC investors as an exogenous shock to geographic distance. In column (1), the sample consists of 10,458 start-up firms in the U.S. with VC investment for the period of 1995-2015. In columns (2)-(4), the sample consists of 811 going-public start-up firms in the U.S. with VC investment for the period of 1995-2015. In column (1), the dependent variable is the logarithm of one plus the total number of financing rounds that the entrepreneur firm receives from VC investors. In column (2), the dependent variable is the ratio of the number of *VC directors* to the total number of directors on the board in the IPO year (*Percent of VC Directors*). In columns (3) and (4), the dependent variables are the return on the first trading day (first-day closing price / IPO offer price) and the ratio of the first-trading-day closing price to the book value of a share after the IPO, respectively. *Reduction in Travel Time_Firm* is an indicator that takes a value of one if VC investors experience a reduction in travel time between the starting year of the first financing round and the last year of the final financing round (or exit year when an exit event takes place). Appendix B provides the detailed variable descriptions. *T*-statistics are in parentheses and estimated using robust standard errors that adjust for industry clustering. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Log (1 + Number of Financing Rounds)	Percent of VC Directors	IPO Underpricing	IPO Valuation (Price to Book)
Independent Variable	(1)	(2)	(3)	(4)
Reduction in Travel Time_Firm	-0.018*	0.009	-0.155	5.737**
	(-1.82)	(0.10)	(-1.24)	(2.17)
Firm-Lead VC Distances	0.001	-0.004	-0.029	-0.006
	(0.61)	(-0.29)	(-0.58)	(-0.01)
Number of Investors	0.020***	0.004	0.013	0.200
	(12.82)	(0.38)	(1.23)	(0.69)
Log (1 + Total Funding)	0.177***	0.039	0.078	-1.905
	(42.09)	(0.68)	(0.88)	(-1.13)
Log (1 + Firm Age at Round One)	0.005	-0.001	0.072	-0.737
	(1.14)	(-0.02)	(0.72)	(-0.18)
Log (1 + Total Funding at Round One)	-0.135***	0.003	-0.095	1.252
	(-24.05)	(0.09)	(-1.49)	(0.58)
Early Stage (indicator)	-0.030***	-0.041	-0.140*	1.199
	(-5.25)	(-1.07)	(-1.69)	(0.16)
Industry Market/Book Ratio	-0.002***	-0.044	0.155	1.726
	(-3.64)	(-1.08)	(1.66)	(0.33)
Industry R&D/Assets Ratio	-0.000	0.005	-0.016	0.135
	(-0.30)	(0.50)	(-0.40)	(0.11)
Industry Asset Tangibility	0.002*	0.005	0.023	-0.026
	(1.78)	(0.83)	(1.16)	(-0.06)
Log (VC Investor Age)	0.001	-0.000	0.131	3.304
	(0.22)	(-0.01)	(0.90)	(1.33)
Log (Total Equity Investment	-0.098***	-0.057	0.043	0.147
by VC Investors)	(-8.42)	(-0.62)	(0.27)	(0.03)
Log (Total Rounds VC	0.181***	0.060	-0.109	-0.588
Investors Participated)	(10.77)	(1.11)	(-0.65)	(-0.07)
Log (IPO Proceeds)				2.434
				(1.35)
Industry Fixed Effects & Year Fixed Effects	Yes	Yes	Yes	Yes
Exit Year Fixe Effects	Yes	Yes	Yes	Yes
Lead VC Fixed Effects	Yes	Yes	Yes	Yes
Firm State Fixed Effects	Yes	Yes	Yes	Yes
Observations	10,458	811	766	662
Adjusted *R*-squared	0.763	0.234	0.404	0.515

Appendix B
Variable Definitions

The Appendix provides detailed descriptions of all the variables used in the tables.

Variable Name	Definition	Data Source
Distance characteristics		
Ew Distances	Logarithm of one plus the equally weighted geographic distance in miles between all of a firm's VC investor pairs. Specifically, if the geographic distances between the VC investor pairs are $dist_{12}$, $dist_{13}$, …, and $dist_{ij}$, then *Ew Distances* is the logarithm of one plus the average of these distances. When there is only one existing VC investor, *Ew Distances* equals zero.	VentureXpert, MaxMind GeoIP Database
Firm-Lead VC Distances	Logarithm of one plus the physical distance in miles between the portfolio firm and its lead VC investor	VentureXpert, MaxMind GeoIP Database
Lead Vw Distances (Equity)	Logarithm of one plus the investment amount-weighted distance in miles between a firm's lead VC investor and its other VC investors. Only VC investor pairs with a lead VC investor are included in computing the distance. Specifically, if the geographic distances between a firm's lead VC investor i and its other VC investors are $dist_{i1}$, $dist_{i2}$, …, and $dist_{ij}$, then the investment amount-weighted distance between lead VC investor i and the other nonlead VC investors (i.e., *Lead Vw Distances (Equity)*) is the logarithm of one plus $(\sum_{ij} dist_{ij} * w_{ij})$, where w_{ij} is the sum of the investment amounts by lead VC investor i and nonlead VC investor j divided by the sum of the investment amounts by all lead VC investor and nonlead VC investor pairs. When there is only one VC investor that is a lead VC investor, *Lead Vw Distances (Equity)* equals zero. Lead VC investors are VC firms that invest the largest amount of equity in the portfolio firms.	VentureXpert, MaxMind GeoIP Database
Lead Vw Distances (Portfolio)	Logarithm of one plus the portfolio share-weighted distance in miles between a firm's lead VC investor and its other VC investors. Only VC investor pairs with a lead VC investor are included in computing the distance. Specifically, if the geographic distances between a firm's lead VC investor i and its other VC investors are $dist_{i1}$, $dist_{i2}$, …, and $dist_{ij}$, then the portfolio share-weighted distance between lead VC investor i and the other nonlead VC investors (i.e., *Lead Vw Distances (Portfolio)*) is the logarithm of one plus $(\sum_{ij} dist_{ij} * w_{ij})$, where w_{ij} is the sum of the cumulative investment share in lead VC investor i's portfolio and the cumulative investment share in nonlead VC investor j's portfolio divided by the sum of the cumulative investment shares in the portfolios of all lead VC investor and nonlead VC investor pairs. When there is only one existing VC investor, *Lead Vw Distances (Portfolio)* equals zero. Lead VC investors are VC firms that invest the largest amount of equity in the portfolio firms.	VentureXpert, MaxMind GeoIP Database
Log (Number of States)	Logarithm of the number of unique states in which a firm's VC investors are located. For example, if the firm has ten VC investors in a particular round, and they are located in seven different states, *Number of States* is seven.	VentureXpert
Vw Distances (Equity)	Logarithm of one plus the investment amount-weighted distance in miles between all of a firm's VC investor pairs. Specifically, if the geographic distances between the VC investor pairs are $dist_{12}$, $dist_{13}$, …, and $dist_{ij}$, then the investment-amount weighted distance between the VC investors (i.e., *Vw Distances (Equity)*) is the logarithm of one plus $(\sum_{ij} dist_{ij} * w_{ij})$, where w_{ij} is the sum of the investment amounts by VC investor i and VC investor j divided by the sum of the investment amounts by all VC investor pairs. When there is only one existing VC investor, *Vw Distances (Equity)* equals zero.	VentureXpert, MaxMind GeoIP Database
Vw Distances (Portfolio)	Logarithm of one plus the portfolio share-weighted distance in miles between all of a firm's VC investor pairs. Specifically, if the geographic distances between the VC investor pairs are $dist_{12}$, $dist_{13}$, …, and $dist_{ij}$, then the portfolio share-weighted distance between the VC investors (i.e., *Vw Distances (Portfolio)*) is the logarithm of one plus $(\sum_{ij} dist_{ij} * w_{ij})$, where w_{ij} is the sum of the cumulative investment share in VC investor i's portfolio and the cumulative investment share in VC investor j's portfolio divided by the sum of the cumulative investment shares in the portfolios of all the VC investor pairs. When there is only one VC investor, *Vw Distances (Portfolio)* equals zero.	VentureXpert, MaxMind GeoIP Database

Airline shock characteristics		
Lead VC Reduction in Travel Time (indicator)	Indicator that takes the value of one if the treatment (*Reduction in Travel Time*) is associated with a reduction in travel time for VC investor pairs involving a lead VC investor	VentureXpert, T-100 Domestic Segment Database, Google Maps
Log (1 + Reduced Travel Time)	Logarithm of one plus the average reduction in travel time in hours between the cities of VC investor pairs for each firm-round observation	VentureXpert, T-100 Domestic Segment Database, Google Maps
Non-Lead VC Reduction in Travel Time (indicator)	Indicator that takes the value of one if the treatment (*Reduction in Travel Time*) is associated with a reduction in travel time for VC investors pairs without involving any lead VC investor	VentureXpert, T-100 Domestic Segment Database, Google Maps
Pre-2005 (Post-2005) Reduction in Travel Time (indicator)	Indicator that takes the value of one if the treatment (*Reduction in Travel Time*) is associated with a reduction in travel time before (after) 2005	VentureXpert, T-100 Domestic Segment Database, Google Maps
Reduction in Travel Time (indicator)	Indicator that takes the value of one if the travel time between a VC investor's city and other investors' VC cities is reduced by more than a half hour in a round trip due to the introduction of new direct airline routes in the period between consecutive investment rounds, and zero otherwise. We restrict new direct airline routes to those that do not involve the city in which the firm is headquartered.	VentureXpert, T-100 Domestic Segment Database, Google Maps
Reduction in Travel Time_Firm (indicator)	Indicator that takes the value of one if the travel time between a VC investor's city and other investors' VC cities is reduced by more than a half hour in a round trip due to the introduction of new direct airline routes in the period between the starting year of the first financing round and the last year of the final financing round (or exit year when an exit event takes place), and zero otherwise. We restrict new direct airline routes to those that do not involve the city in which the firm is headquartered.	VentureXpert, T-100 Domestic Segment Database, Google Maps
VC financing characteristics		
Early Stage (indicator)	Indicator that takes the value of one if the firm receives its first VC investment in the seed or early stage, and zero otherwise	VentureXpert
Log (1 + Duration between Two Financing Rounds)	Logarithm of one plus the duration in months between the current and next financing rounds. Following Tian (2011), *Duration between Two Financing Rounds* is computed as the duration between the last financing round date and an exit event date if the firm exits through either an IPO or acquisition (the end of our sample period if the firm is still in the middle of an ongoing round).	VentureXpert
Log (1 + Number of Financing Rounds)	Logarithm of one plus the total number of financing rounds that the firm receives from VC investors	VentureXpert
Log (1 + Total Funding)	Logarithm of one plus total VC funding ($ millions) that the firm has received	VentureXpert
Log (1 + Total Funding at Round One)	Logarithm of one plus total VC funding ($ millions) that the firm received in the first financing round	VentureXpert
Log (VC Investor Age)	Logarithm of the VC investors' average age when the entrepreneurial firm receives the first round of financing from its VC investors. A VC investor's age is measured as the number of years between its founding year and the venture round year.	VentureXpert
Log (1 + Total Equity Investment by VC investors)	Logarithm of one plus the average amount of equity that VC investors have invested	VentureXpert
Log (1 + Total Rounds VC Investors Participated)	Logarithm of one plus the average number of investment rounds that VC investors have participated	VentureXpert
Ratio of Convertible Securities	Ratio of the amount of convertible debt and convertible preferred stock to the total funding amount in each financing round	VentureXpert
Successive VC Syndication	Ratio of the number of VC investors that participate in both the current and previous syndication rounds to the total number of VC investors in the previous syndication round	VentureXpert

Firm characteristics		
Being Acquired (indicator)	Indicator that takes the value of one if the firm that receives VC financing is acquired with a deal value greater than $25 million, and zero otherwise	VentureXpert
Exit (indicator)	Indicator that takes the value of one if the firm that receives VC financing goes public via an IPO or is acquired with a deal value greater than $25 million, and zero otherwise	VentureXpert
Going Public (indicator)	Indicator that takes the value of one if the firm that receives VC financing goes public via an IPO, and zero otherwise	VentureXpert
Log (1 + Firm Age at Round One)	Logarithm of one plus firm age in years in the first financing round	VentureXpert
Percent of VC Directors	Ratio of the number of board seats in a portfolio firm that VC investors have to the total number of directors on the board in the IPO year	VentureXpert, SEC Form 424B
Industry Market/Book Ratio	Median ratio of the market value of equity to the book value of equity in the industry	Compustat
Industry R&D/Assets Ratio (%)	Median ratio of R&D expenditures (zero if missing) to total assets in the industry	Compustat
Industry Asset Tangibility (%)	Median ratio of tangible assets to total assets in the industry	Compustat
IPO characteristics		
Log (IPO Proceeds)	Logarithm of dollar amount raised in the IPO (i.e., offer price times the number of shares offered)	VentureXpert, SDC Platinum
IPO Underpricing	Return on the first trading day (first-day closing price / IPO offer price)	VentureXpert, SDC Platinum
IPO Valuation (Price to Book)	Ratio of the first-day closing price to the book value of equity per share after the IPO	VentureXpert, SDC Platinum